CW SAMPLE COPY
M148103UIVYMUIVYM FC#3 FC
UNIVERSITY MICROFILMS
SERIAL PUBLICATIONS
300 N ZEEB RD
ANN ARBOR MI 48103

NEWSPAPER

IBM On Trial

U.S.: Gathering Steam

By Catherine Arnst
Of the CW Staff

NEW YORK – IBM attempted to turn plug-compatible manufacturers (PCM) into "dying companies," Justice Department attorneys charged recently as the government began the peripherals portion of its antitrust case against the corporation.

The government will attempt to prove that separate and distinct markets exist for the different peripheral products, that PCMs were able to enter those markets successfully with products equal to or better than IBM's at prices 10% to 15% lower and that IBM used its dominance in the computer market to destroy that competition.

In what it considers one of the more powerful segments of its case against IBM, the government will present approximately 550 documents and 13 witnesses to the court in the next few months.

Those witnesses will include Laurence Spitters, founder and former chairman of the board of Memorex Corp., three others from Memorex, three witnesses from Storage Technology Corp., two from California

(Continued on Page 2)

Calcomp: 'Show and Tell'

By Molly Upton
Of the CW Staff

LOS ANGELES – The California Computer Products, Inc. (Calcomp) antitrust trial against IBM will be a "show and tell" trial illustrated by charts, judging by the opening statements of both sides.

Charts are but one illustration .of how trial by jury will influence the conduct of the case.

Judge Ray McNichols denied IBM's motion for a mistrial the morning after Calcomp attorney Max Blecher's opening statement.

David Boies, attorney for IBM, had asked for a mistrial on the grounds that Blecher's statement (see story on Page 3) "went very substantially beyond what is appropriate in any case, particularly before a jury."

Blecher's remark contained "constant repetition of argumentative words," whose only purpose was to "prejudice, confuse and inflame the jury," Boies said.

Blecher also used IBM documents in a misleading manner, taking at least one out of context, he said. That document, according to Blecher's

(Continued on Page 3)

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
Weekly Newspaper   Second-class postage paid at Boston, Mass., and additional mailing offices
© 1976 by Computerworld, Inc.
Price: $15/year   November 22, 1976   Vol. X, No. 47

An Offering Not for the Novice

IBM Moves Into Mini Arena With Series/1

By Esther Surden
Of the CW Staff

NEW YORK – IBM made its long-expected move into the minicomputer arena with the introduction of the Series/1 here last week.

The Series/1 is a minicomputer in every sense – from its 16-bit word and its limited operating system software to its purchase-only status.

It is also in the price range of standard minicomputers.

A Series/1 Model 3B with 32K bytes of storage, diskette and disk combination unit, printer and attachment for a teletypewriter costs $22,312, according to an IBM spokesman. The CPU with 16K bytes of memory costs $5,190, he added.

The Series/1 was designed for volume use by sophisticated organizations with programming and systems design know-how, but quantity discounts will not be available, IBM said.

The modular, component-oriented mini, which can be configured in any number of ways, is in the performance range of the Digital Equipment Corp. PDP-11/34, Hewlett-Packard (HP) 21MX and Data General Corp. (DG) Nova, the spokesman claimed.

DEC and DG would not comment on the cost of their comparable minicomputers. HP, however, said the Series/1 could be compared to its 660 nsec 2112A with 14 I/O slots and 16K bytes of memory which costs $7,900 including extensive software and is discountable.

Two Series/1 processor models with two submodels each were introduced. The Model 3A on one board fits into half the width of the available 19-in. rack space and contains a card cage with four I/O card slots. Each I/O card can address one to 16 devices, the firm said.

The Model 3B differs from the 3A only in that it has 13 I/O slots.

Both units feature a 64K-byte maximum storage capacity with an 800 nsec cycle time for the memory. Average instruction time is 11.8 μsec, IBM said.

The Model 5A can accommodate up to 64K bytes of memory and has eight I/O slots. The B model can accommodate up to 128K bytes of memory and has three I/O slots.

Memory cycle time for the Model 5 is 660 nsec; average instruction time is 3.9 μsec. Both units include a storage protect feature and are contained on three boards, IBM noted.

The Model 3 has a 168-instruction set while the Model 5 has 177 instructions. Each can address up to 256 devices and features four priority interrupt levels with

(Continued on Page 4)

CPE Finds Three 65s Can't Equal a 168

By Don Leavitt
Of the CW Staff

ATLANTA – Although the CPU capacity of an IBM 370/168 is roughly three times that of a 360/65, the 168 can absorb "considerably more" work than would saturate three 65s, according to a computer performance evaluation (CPE) technician with American Airlines.

American's in-house evaluation and benchmark team reported these results as part of its evaluation of a 4M-byte 370/168 and a 4M-byte Amdahl 470V/6, according to Bill Miller, who explained the airline has already made the decision to buy one or the other.

Presenting a paper at the annual national meeting of the Computer Measurement Group (CMG) here last week, Miller said the performance of a Model 65 "is generally agreed to degrade" when the total CPU occupancy goes above 60% to 70%.

However, he added, "a 370/168 can be driven at essentially 100% for sustained periods of time" and further economies are available from consolidating peripheral devices and other resources required to satisfy peak demands on several machines.

The CPE staff at American reached these conclusions in its still continuing search for another large-scale processor for its commercial DP operations, Miller said.

The current equipment consists of a 370/168-1 surrounded by 40 6,250 bit/in. tape drives, 64 Memorex 3330-type disk drives and 16 IBM 3350 fixed-head disk units.

Evaluation Tools

The airline is using a number of tools to aid its evaluation, he told the group. The three basic types of tools include SMF analysis packages, software monitors and hardware monitors.

In most large-scale IBM shops – including American Airlines – SMF data is collected "as a matter of course" and "failing to glean as much information as possible from [this] data [would be] a serious mistake," he said.

Miller's group uses the Sara package, developed by Boeing Computer Services, to analyze SMF output, running it daily as the source of most routine management reporting, he explained.

Software monitors yield more detailed information about system internals than SMF but, used poorly, they can create overhead, tie up an initiator and cause system crashes, he warned.

Nonetheless, American uses the Configuration Utilization Evaluator (CUE) package from Boole & Babbage, Inc.

Hardware monitors attach to the wiring of a computer system and cannot produce the problems some software monitors do. However, the large sophisticated type of monitor American needed is a very expensive piece of gear, he said.

Miller's group recently acquired a Tesdata MS88-III for use in providing continuous system profiles for all major applications as well as doing detailed measurements for the IBM-Amdahl benchmark, the technician said.

Ryan, Hammer Theories Collide On DP's 'Pathway to the Future'

By Edith Holmes
Of the CW Staff

ALEXANDRIA, Va. – Computers should be used for the economic replacement of routine tasks, but not in areas where human judgment is involved, Dr. Frank B. Ryan, director of information systems for the U.S. House of Representatives, told the Association of Computer Programmers and Analysts (Acpa) conference here recently.

The more memory the computer industry can pack on a chip, the closer human society will come to artificial intelligence and from there to voice-to-voice communication with computer systems, Dr. Carl Hammer, director of computer sciences for Sperry Univac in Washington, D.C., said to the same meeting of programmers and analysts a day later.

Two different men. Two opposing ideas. A pivotal point on which the conference, entitled "Pathways to the Future," turned.

At the beginning of his career, Ryan was a football player, a quarterback for the Cleveland Browns and then for the Washington Redskins.

While playing for the Browns, Ryan wrote a computer program called "Probe" to organize and analyze football data, aiding trend analysis. Ryan said he devised the program to take the drudgery out of the night-before-the-game strategy sessions.

Probe provided a study of the opposing team and a strategy for the Browns to

(Continued on Page 4)

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM Reg. U.S. Pat. Off.

EDITORIAL

Editor	E. Drake Lundell Jr.
Deputy Editor	Ronald A. Frank
Managing Editor	Nancy French
Associate Editor	Donald Leavitt
Associate Editor	Esther Surden
Associate Editor	Molly Upton
Computer Industry Editor	Toni Wiseman
Staff Writers	Catherine Arnst John P. Hebert Edith Holmes
Chief Copy Editor	Cheryl M. Gelb
Copy Editors	Bobbi C. Sternheim Barbara T. VanScoyoc
Photography Editor	Ann Dooley
Editorial Assistant	Denise Petski
Editorial Cartoonist	Jim Orton
Bureaus:	
London	Roger R. Frampton
Munich	Dr. Gerhard Maurer
Asia	Hidetsuna Sasaki
Contributors:	
Education	J. Daniel Couger
Legal	Roy N. Freed
Taylor Reports	Alan Taylor
Contributing Editor	Edward J. Bride

SALES

National Sales Manager	Roy Einreinhofer
Advertising Administrator	Judy Milford
Display Advertising	Sara Steets
Classified Advertising	Pam Palmer
Recruitment Advertising	Kathy Steinberg
Sales Promotion Director	Jack Edmonston
Market Research	Kathryn V. Dinneen

CIRCULATION

Vice-President/ Circulation	Margaret Phelan
Assistant Manager	Barbara Jeannetti

PRODUCTION

Manager	Lee Vidmer
Supervisor	Henry Fling
Assistant	Peter Holm

Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass 02160 Phone: (617) 965-5800. Telex 92-2529.

OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone: (01) 485-2248/9; Telex: 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 Munchen 40, Tristanstrasse 11. Phone: 36-40-36/37 Telex: 5215350. **Asia:** Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone. (03) 445-6101. Telex. 26792.

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160 Copyright 1976 by Computerworld, Inc. All rights reserved.

50 cents a copy. $15 a year in the U.S.; $23 a year for Canada and PUAS; all other foreign, $40 a year. Four weeks notice required for change of address. Please allow six weeks for new subscription service to begin.

Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to Walter Boyd.

Computerworld can be purchased on 35 mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich 48106 Phone (313) 761-4700.

COMPUTERWORLD, INC.

Board Chairman/ Publisher	Patrick J. McGovern
President	W. Walter Boyd
Vice-President	Margaret Phelan

ABC ABP mcc MEDIA DATA FORM

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Massachusetts 02160.ac

As Calcomp vs. IBM Opens

Defense Stresses Competitive Market

By Molly Upton
Of the CW Staff

LOS ANGELES – The DP industry demonstrates all the elements of a competitive environment where participants are constantly needing to upgrade their products and reduce prices in order to obtain and retain business.

David Boies, a lawyer for IBM, thus set the tone for IBM's defense in the antitrust case filed against it by California Computer Products, Inc. (Calcomp).

Focusing on the issue of monopoly for the entire morning and into the afternoon, Boies told the jury that in order for Calcomp to recover damages, it would have to establish all five of the following points:

- What the market is.
- IBM possesses monopoly power in that market.
- IBM has achieved its position in the industry in some kind of wrongful way.
- IBM's actions were wrong and damaged Calcomp.
- The extent to which Calcomp was damaged.

Jack Brown, another lawyer for IBM, amplified the last two points in IBM's defense and indicated Calcomp's declining revenues resulted from being outpaced by advances in disk drive technology and Calcomp's own management problems, not action by IBM.

In deciding whether IBM is a monopoly, Boies said the jury would have to ask itself whether "IBM is a company able to sit back and ignore competitors, leading a quiet life, or whether it is constantly forced to improve its product and reduce prices."

If customers have no alternative to an overpriced product, then there is a monopoly, he said.

Calcomp has done well in the computer business, he said, having been able to offer products at lower costs than IBM's because it copied them and, therefore, didn't incur extensive research and development costs.

To illustrate IBM was no larger than its competitors, Boies showed a 1952 ranking of the revenues of large U.S. industrial firms. IBM was seventh behind such future competitors in the DP field as General Electric, RCA and Sperry Rand.

Calcomp, he said, has conceded 31 companies compete in the general systems marketplace. But there are many more including Hewlett-Packard, Interdata, Four-Phase Systems and Itel, he said.

Boies then showed several charts illustrating the rise of firms' DP revenues during the period in which Blecher had said IBM sounded "the death knell."

Although all of the companies illustrated showed revenue growth, Boies did not once mention earnings or losses of these firms.

This growth in both the number and size of firms in the industry and their ability to compete illustrates the lack of monopoly power, he said.

Boies said he will counter Calcomp's charge that IBM kept revenues constant by raising CPU prices while lowering disk prices, for example. His retort to this argument is that computing costs have declined despite a rise in the consumer price index.

This price decline is the "best illustration of the fruits of competition in the industry benefiting the consumer," he said. IBM has been a leader in improving price/performance offerings.

"In effect, Calcomp is arguing that IBM should be required to keep its prices high so it [Calcomp] could make more money," Boies said.

Boies said IBM has three basic beliefs which contribute to its success:

- It must maintain respect for the individual.
- IBM should provide the best customer service.
- The organization should strive to do every task in a superior fashion.

The Calcomp claims, Brown charged, are based on two erroneous assumptions – that there would be continued demand for old disk products and that even if these products were obsolete, as they were by 3330 technology, Calcomp could continue to get a fair price for them.

U.S. vs. IBM Gathering Steam

(Continued from Page 1)

Computer Products, Inc., three representing add-on memory manufacturers and two from the Bank of America.

"Prior to IBM's actions to eliminate and restrict actual and potential competition in the plug-compatible peripherals market, the PCMs were successful in the small segment of the market they captured.

The peripherals market was important to IBM because it accounted for 53% of total systems business in 1970; by that year, PCMs had made considerable inroads into IBM's dominance of that market, the government said.

A number of companies had entered the peripherals market after IBM announced its 360 line in 1966 because, for the first time, IBM's differently sized commercial systems were capable of using identical peripheral equipment; the plug-compatible market was made even more attractive by IBM's high price levels and profit margins on these products.

IBM designated peripherals as a "key corporate strategic issue" in 1970 after the government issued a directive in the Peripheral Equipment Procurement Bulletin No. 70-9 requiring federal agencies to "review all installed leased peripheral components for which there are compatible, reliable and comparable substitutes available at lesser cost.

At a management committee meeting after this bulletin was issued, IBM internal documents show, the corporation decided to assess all factors affecting the impact of competitive products on IBM's business and then produce a strategy of technical escalation.

One of the strategies a task force recommended and IBM adopted, code-named "Mallard," was aimed at the disk drive market.

The government claimed this disk drive was only a revised version of the 2314 because IBM had replaced one spindle with a portion of the control function normally found in the 2314 controller.

The remainder of the control function was transferred to the CPU and called an Integrated File Adapter, Justice contended.

In the tape drive market, IBM attempted to undermine competitors with a new series of tape drives, the 3420, code-named "Aspen," the government claimed. The 3420 was a "warmed-over" version of the "overpriced" 2420, whose sales were dropping, it said.

Aspen had the same physical and performance specifications as the 2420 but a different interface design and price tag.

In order to prevent further competition, IBM approved long-term lease plans in early 1971 that would offer substantial price reductions to users while locking them into a total IBM system. Through the Fixed Term Plan (FTP), offered for tape drives, disk drives and printers, IBM offered an 8% discount on a one-year lease and a 16% discount on a two-year lease.

In order to recoup its losses from the leasing plans, IBM announced price increases in July 1971 on CPUs, memories and other portions of the systems not covered by FTP. In August 1971, IBM executives predicted "the net effect of [FTP] and CPU price changes will be a wash insofar as business volumes are concerned," internal documents said.

On the Inside This Week

NEWS

U.S. vs. AT&T Antitrust Trial Gets Rolling Again 4
Software People: Keepers of Man-Machine Interface 5
Cost-Control System Suggested to Involve Whole Firm 6
Illinois Inviting Citizens to 'Beat Bum Rap Sheets' 7
Mass. Moves in Haste, But May Soon Repent in Leisure 8
Employee Motivation Seen Key to Outcome of Projects ..10
DP Hit for Ignoring Corporate Decision-Making Needs ...11
Taxpayers Sue School District Over 370 Acquisition 12
Future Shops Seen Coordinating Distributed Processing ..13

EDITORIAL

Editorial: Promise and Peril 14
Schechter Gave Incorrect Definition of the Julian Date ...15
Taylor Report: DPers: Prepare for Real Data Base Life ...15

SOFTWARE & SERVICES

Microprocessor Revolution Changing Focus of CPE 17
IUP Extends IBM Life Insurance Program 18

COMMUNICATIONS

Survey Finds Users Favor Unrestricted DP for Carriers ...20
IBM Brings Out 3660 Enhancements 21
CMC 1800 Gets Remote Keystations 22

SYSTEMS & PERIPHERALS

Doctrine of Separation Suggested for DP Departments ...23
Multi-CPU Sites Get CPI Monitor 24
Baking Firm Whips Up Savings With Data Entry System ..25

MINIWORLD

Varian V77 Aimed at Multi-CPU Nets 26
Growth Forces Small Firm to Switch to Larger Mini 28

COMPUTER INDUSTRY

Study Shows Four Makers Grew 38% 30
Vendors Not Harmonizing on Common DDP Definition ..30
BASF Sees Trend to 'Winchester' Disks 31
Shift Seen in Distribution of Terminals 33

Plaintiff Claims Documents Will Prove IBM's Guilt

By Molly Upton
Of the CW Staff

LOS ANGELES – California Computer Products, Inc.'s (Calcomp) $102 million antitrust suit against IBM will be conducted largely through examination of internal IBM documents, Calcomp attorney Max Blecher told the jury in his day-long opening statement here last week.

The jury can "determine IBM's guilt by its own documents [which constitute] a diary of all acts and purposes" with which Calcomp is charging it, he said.

IBM, between 1963 and 1972, undertook conduct to "eliminate, suppress and destroy competition for the purpose of maintaining its monopoly," Blecher said. The 1972 date was selected because that was the year in which IBM last attempted "to do in" Calcomp, he explained.

This "nailed the lid in the coffin of a company which until then had been a vigorous, profitable company," he said.

Calcomp is charging IBM attempted and/or succeeded in its monopolization plans for the industries of general-purpose systems, disk drives and disk drives attachable to IBM 360s and 370s.

Blecher used the analogy of a gun turret that could turn and lash out at different areas IBM saw as threatening.

Why the three areas? Partially to show IBM had the capacity to trade off profits from one area to another when it decided to focus its turret, he said.

For example, Blecher said he will illustrate through IBM documents that IBM decided to take low profit margins on certain CPUs it would market for prestige reasons while recouping much of this low profit margin through high peripheral charges.

When the number of IBM mainframe competitors had been reduced, IBM then focused on the plug-compatible manufacturers such as Calcomp, he said.

Again through IBM documents, Blecher said he intends to prove to the jury that IBM used this procedure in reverse, cutting prices by repackaging its 2314 drives as 2319M.

IBM then initiated its Fixed Term Plan (FTP) which offered users at least a 16% savings over two years – but a month later, it raised CPU prices to make the FTP costs to IBM a wash item, Blecher said.

After focusing on IBM's and others' views of the corporation's market share in the general-purpose systems industry, the Calcomp case will look at IBM's actions in the systems area, Blecher said.

The attorney showed the jury various IBM documents indicating IBM had over 70% of the general-purpose market between 1964 and 1969.

In the scientific area, Blecher's thesis that IBM did not maintain its monopoly solely through superior products is supported by documents that show IBM machines were "outpriced and outperformed," according to Blecher.

The Calcomp case will then focus on IBM's attitude toward and reaction to the leasing industry, which it came to regard as a competitor, not a customer.

Leasing Industry Strategy

IBM deliberately calculated its multipliers, or the number of months' rent, that equal the purchase price, in order to "knock lessors out," Blecher stated.

The company also deliberately brought out the 370/155 and 165 "with the knowledge these would be withdrawn in 18 months, leaving lessors with an inventory of obsolete machines," he charged.

Lastly, the prosecution will focus on actions in the plug-compatible industry, an issue with which Calcomp is personally concerned and for which it claims damages.

Calcomp vs. IBM: 'Show and Tell' Trial

(Continued from Page 1)

presentation, showed IBM management contemplating leaking to the investment community news of its planned 370s two years before their introduction.

The purpose of such action, Blecher alleged, would be to help dry up financing available to lessors.

Because the jury had witnessed Blecher's version of this document, it was "just not susceptible to later coming back and correcting" its mistaken impressions, Boies argued.

At the end of the day when the jury was dismissed, McNichols talked to counsel and spectators.

For the record, he said he recognized that opening statements in this case "have gone far beyond the normal scope of opening statements."

But doing so has done far more to further the jury's understanding of the case than proceeding with the old "sterile" type of opening statements, he added.

After IBM attorney Jack Brown described what some would consider unethical although not illegal activities by Calcomp, McNichols remarked the "pot and the kettle are equally discolored."

In attempts to indicate to the jury how incriminating internal documents from the other side are, both Calcomp and IBM have enlarged reproductions of these papers, in addition to fancy graphs.

The IBM counsel table was festooned with a large pink and yellow inflated duck as well as several toys and other gadgets which represented a money-losing venture by Calcomp.

During his discussion of Calcomp's attempts to obtain and copy IBM's disk designs, Brown placed before the jury two spindles from a 3350 drive. He also gave them a head and arm from the drive and showed an enlarged version of that mechanism.

Spectators who had lined up at 8:30 a.m. to procure a seat on uncomfortable wooden benches appreciated the repartee between the judge and lawyers on the subject of the toys.

Attorneys for both sides seem acutely aware the case could proceed to appeals court. In replying after Boies' objection about his use of documents, Blechers stated IBM intends to fight the admission of evidence document by document since it expects to be the appellee in the appeals court.

Blecher compared the IBM tactics to Iwo Jima. "We'll win, but it will be one piece of real estate at a time.

"This is the same kind of assault IBM has waged on Edelstein," he said, referring to the judge in the New York trial.

ADR® SOFTWARE
REDUCES PEPSI-COLA DP EFFORT

Pepsi-Cola's computer operation plays a big part in ensuring that Pepsi-Cola drinkers everywhere have abundant supplies of their favorite beverage. Over 200,000 man-hours are invested each year in software system development, documentation, management, and use. It's no wonder that Pepsi-Cola looks upon its program library as an important asset to be protected and made more efficient in every possible way. And software products from Applied Data Research are an important part of that effort.

Pepsi-Cola Uses MetaCOBOL® in Many Ways to Improve Efficiency.

MetaCOBOL was initially used for converting programs from DOS to OS. One of the first tasks was to convert the 45-program National Accounts System. The conversion was complete in just a couple of weeks—a 99% conversion that required only a very few additional macros to meet special requirements. According to Pepsi-Cola's programming staff, their effort was four times less than what they had estimated with their old conversion methodology. MetaCOBOL was immediately productive and almost paid for itself on that first job.

Pepsi-Cola has found a growing number of uses for both MetaCOBOL and the many MetaCOBOL facilities. Data Division Laundry (DDL), for example, is routinely used each time a program is changed for maintenance. Pepsi-Cola reports that DDL cleans up many of the things a programmer may forget to do, such as placing signs on Numeric Picture items and specifying Object-Computer as IBM-370 rather than IBM-360 to take advantage of the more efficient 370 instruction set.

MetaCOBOL's Run-Time Debugging Aid (RDA) Saves Time and Improves Morale, Particularly with Junior Programmers.

Junior programmers are encouraged to debug at the source language level rather than depending on their ability to take apart a dump. By using RDA, they find that they have a tool that has left them with confidence that they can always identify where the problem is. And Pepsi-Cola's DP staff thinks that's a great thing for a new programmer to have.

The LIBRARIAN® From ADR Maintains Central Control Over the Use and Modification of All Programs.

The LIBRARIAN was initially installed 4 years ago to simplify and control program update procedures. It is now a fundamental tool used to maintain central control over the use and modification of all programs. The use of The LIBRARIAN reduced the chances of program status confusion and the possibility of lost card decks. Its facilities for source program maintenance, control, and security have made strict accountability an almost automatic daily process.

Each ADR product is not just a program but a complete package with full documentation and on-site support. ADR is the only software company with 50 branch offices and representatives in 31 countries—each staffed with ADR-trained technicians.

For more information on what ADR software can do for you, call or write

APPLIED DATA RESEARCH
SOFTWARE PRODUCTS DIVISION
Route 208 Center, Princeton, N.J. 08540, Phone: 609-924-9100.

ADR software products: in use at over 5000 installations worldwide.

U.S. offices in Boston (617) 245-9540, Chicago (312) 694-2244, Cleveland (216) 228-0880, Houston (713) 526-3188, Los Angeles (213) 826-5527, New York (212) 986-4050, Princeton (609) 924-9100, Washington (703) 281-2011.

Foreign offices in Australia, Austria, Belgium, Brazil, Canada, Denmark, England, Finland, France, Germany, Hong Kong, Israel, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Philippines, Portugal, Puerto Rico, Republic of South Africa, Singapore, Spain, Sweden, Switzerland, Taiwan, Thailand, Venezuela.

IBM Enters Mini Arena With Series/1

(Continued from Page 1)

eight general-purpose registers per level.

Bit, byte, word and double-word addressing can be accommodated, the spokesman noted. Power failure detect and automatic restart are standard features.

The I/O channel can operate under direct program control or can cycle-steal. Data is transferred on either a byte or word basis and parity checking is available on a byte basis.

Data is transferred over the channel at 1.2M byte/sec maximum for the Model 3 and 1.6M byte/sec maximum for the Model 5, IBM said.

The Series/1 comes with no standard higher level programming language. Operating system software provided at no charge consists of Stand-Alone Utilities (formerly known as the System Control Program).

The Stand-Alone Utilities include modules to prepare and service disk and diskette devices, IBM said.

Software not included but available is Control Program Support, a set of object modules which provide task management and DP I/O support. IPL loaders for both the disk and diskette are provided. This product costs $15.50/mo on a 24-month, paid-up license basis, IBM said.

Also available is a Base Program Preparation Facility (BPPF) for applications program development. It includes a text editor, macro assembler and linkage editor and costs $90/mo on a 24-month, paid-up lease.

With the BPPF, "theoretically any higher level language can be programmed, provided the user generates his own compiler," the spokesman noted.

If a Series/I CPU is sold by a user after the 24-month period, the new user will have to pay to relicense the software, he indicated.

An optional I/O expansion unit for the Series/1, including a power supply, provides space for up to 14 additional feature attachment cards.

Communications can be handled on the Series/1 via asynchronous, binary synchronous, or Synchronous Data Link Control (SDLC) single-line control at 9,600 bit/sec maximum; high-speed binary synchronous single-line control at 56 kbit/sec maximum; or asynchronous and binary synchronous four- or eight-line control at 9,600 bit/sec maximum, IBM said.

The Series/1 CPUs can communicate with IBM 360/370s, IBM 3s or each other under SDLC, the spokesman noted.

The floating-point processor option for the system allows both single- and double-precision arithmetic using 30 additional instructions and four 64-bit registers, IBM said.

Another optional feature is the Model 4964 diskette unit featuring IBM's double-sided floppy disk. The microprocessor-controlled unit, which is capable of reading and writing on both sides of a diskette, can contain 492K- to 606K bytes of storage depending on the sector size chosen.

Data formats of 128-, 256- and 512 bytes per sector can be accommodated. The average data rate is 31.2 kbyte/sec, the firm said.

A Model 4962 9.3M-byte disk storage module with two movable data heads and 303 track/head is another optional feature for the Series/I. Average access time is 40 msec with an average access time of 10.1 msec.

A fixed-head option adds another 120K bytes of storage capacity, the spokesman said. A combined diskette and disk unit is also available.

A sensor I/O unit, also optional, can be mounted in half of the standard rack. It includes power supply, terminator card and slots for eight sensor I/O feature cards. The cards are of standard size, IBM emphasized, to facilitate the attachment of standard sensor I/O devices.

Additional optional features include the Model 4974 serial printer, a 120 char./sec bidirectional tabletop matrix printer with a 64-character set, a CRT with a 24-line by 80-character dispiay and a 66-key keyboard with a battery backup unit.

Catamore Case Takes Unusual Appeals Turn

BOSTON – In an unusual move, the First Circuit Court of Appeals here last week ordered IBM to provide additional data on its case with Catamore Enterprises, Inc. before issuing a ruling on the jewelry manufacturer's petition for a rehearing of the case.

Sources described the move as "unusual," adding that if the court is about to reverse itself, this would probably be a logical step in that process. No one around the court could remember such a request being made before.

Earlier, the appeals court had overturned a lower court decision awarding Catamore $11.4 million in damages, holding that Catamore had waited too long to file its case against IBM and the jury in the original trial hsd not specifically found IBM guilty of fraud.

Catsmore is now seeking to have the appeals court rehear that decision. If the appeals court does not rehear the case, it has ordered a new trial for the case at the district court level.

In s statement, Thomas K. Christo, attorney for Catamore, said, "We're very encouraged by the court's action and are looking forward to a new appellate opinion.

Correction

The Burroughs Corp. B1800 series provides 40%, not 40 times, more throughput than its B1700 predecessor [CW, Nov. 15].

AT&T Antitrust Trial Gets Rolling Again

WASHINGTON, D.C. – After debating the question for nearly two years, a federal judge here has decided he and his court do have the authority and responsibility to hear the U.S. government's antitrust suit against AT&T.

Judge Joseph C. Waddy ruled from the bench last week that the U.S. District Court for the District of Columbia, not the Federal Communications Commission (FCC), has jurisdiction over U.S. vs. AT&T.

First raised by AT&T in February 1975, the question of whether the federal court or the FCC should hear the government's complaint against the telephone company caused Waddy to stop all document exchanges and interviews with prospective witnesses by the parties.

The judge's decision on Nov. 16 means the Justice Department and AT&T can move on with their discovery procedure.

Ryan, Hammer Theories Collide

(Continued from Page 1)

follow, he explained.

Shortly after writing Probe, Ryan was "dismissed" from the Browns and went to play for the Redskins. In Washington he encountered Vince Lombardi, who was excited about Probe's possibilities.

The system was developed and successfully marketed, Ryan recalled. It ran on a central computer based in Cleveland and was used jointly by the Giants and the Redskins – except when they played each other, he said.

In 1971, these two teams won five games and lost 23. Both coaches were fired and "Oro-Probe," as the program was then called, was canned, Ryan said.

Two things were wrong with Probe, its author ststed. Before the program, the coaches enjoyed the freedom of using their own intuition. The computer system forced them into a rigorous method to which they weren't accustomed.

Probe took human judgment out of planning strategy. Ryan concluded he really couldn't put this human sctivity into a machine.

The eight computer systems in the legislative branch of the Federsl government elther substitute for or complement a routine procedure, Ryan said. None of these systems have applications that replace human judgment.

Carl Hammer, who has been involved in electronic computing since it began, presented a somewhat different view.

"It took man thousands of years to shake off physical labor," Hammer said. "Now we must learn to let machines do our mental drudgery for us; we must become a knowledge society."

The 1M chip is coming, he predicted, and with it a kind of "artificial intelligence" including computer voice input.

"Today, we communicate with the computer through our fingers," he said, pointing out the inefficiencies – not to mention the errors – involved in this process.

"With 1M chips, we'll be able to go to computer voice input," Hammer said, adding "selective speech recognition is going on now, but it won't be practical until we have a 100K chip or better.

Computer voice input will be followed by true voice recognition represented by going from voice into print. Chips with 10M capacities will permit language translation – from print to print. Chips with 100M capacities will allow voice-to-voice language translation, thus putting all the United Nations translators out of business, Hsmmer said.

Learn How You
Can Meet the Challenges of
Two New Trends In Computer Development!

C.A.C.I.

Presents . . . .

TWO NEW SEMINARS FOR MANAGERS

- PRIVACY/SECURITY LEGISLATION: NOV 30-DEC 1

How You Can Plan Now to Conform to New Laws Affecting Your Information Systems.

- DATABASE OVERVIEW: DEC 2-3

A Manager's Overview of Database Systems: Planning, Implementation and Maintenance.

TWO NEW TECHNICAL SEMINARS

- DATABASE DESIGN: DEC 7-9

A Package Independent Study of Database Structures, Concepts, and Applicable Techniques to Meet Your Requirements.

- DATABASE ANALYSIS: Dec 14-16

A Technical Walk Through Today's Package Wonderland: Current and New Packages Evaluated.

WHERE: Washington D.C. - Hay Adams Hotel
800 16th Street, N.W., Washington, D.C. 20006

Fees: $325 each for the two day management seminars
$450 each for the three day technical seminars
(fees include luncheons and all materials)
To Register Call Marge Malore
CACI, INC-COMMERCIAL
75 Rockefeller Plaza, New York, N.Y. 10019
(212) 541-6240

Urged to Manage Technology's Destiny

Software People: Keepers of Man-Machine Interface

By Edith Holmes
Of the CW Staff

ALEXANDRIA, Va. – "It is up to you, the programmers and analysts, to serve as the interpreters between the human being and the machine," Rep. Charles Rose told the annual conference of the Association of Computer Programmers and Analysts (Acpa) here recently.

"The software challenges are not with technique but with content, and the real pressures that face the whole industry in the future will center not on mechanical and technological fantasies but on designing software to meet the needs of the users," the North Carolina Democrat said in his keynote address to Acpa's sixth annual meeting.

Comparing the technology of the computer and communications industry to a train moving forward at increasingly uncomprehensible speeds, Rose urged his listeners to manage destiny, "to take charge of the train."

Rose, who chairs the Ad Hoc Computer Subcommittee of the Committee on House Administration in the U.S. House of Representatives, drew his analogy from a story about Supreme Court Justice Oliver Wendell Holmes who, at age 88, found himself on a train and unable to find his ticket.

Recognizing the jurist as he searched unsuccessfully through his coat pockets, the conductor told Holmes not to worry. He would probably find the ticket later, and the Pennsylvania Railroad could certainly trust him to mail it in, the conductor said.

The congressman said Holmes then looked up at the conductor with some irritation and said, "My dear man, that is not the problem at all. The problem is *not* where my ticket is. The problem is, where am I going?"

Technology Train

"We are on a technological path, a train if you like; we have been given the right to passage; and we are speeding forward. Suddenly, when it comes time to turn in our technological ticket to get off the technological train, we don't know where it is," Rose said.

"And what is worse, we have become so programmed to follow directions and punch time clocks that we have forgotten where we are going."

How fast is the train going? Advances in computer-assisted instruction and medical diagnosis by computer and the possibilities presented by voice-sensitive typewriters and complete home telecommunications systems give some idea of the speed with which technology is moving forward, the congressman suggested.

Software people – not hardware people – should have charge of the human interface, in Rose's view.

"The inventors of hardware and the entrepreneurs who sell it have unbounded enthusiasm for the future, for they clearly see that anything is technically possible and they are rushing forward to invent it," he said.

"Unlike Justice Holmes and many of us, they have their keypunched tickets firmly in hand; some of them have even laid the railroad track and built the train; and they know *exactly* where they are going.

"Hardware people love hardware. But sometimes software folks wonder if they love people," Rose continued.

Software is the key to using technology creatively, the congressman said.

"Justice Holmes had a ticket with the name of the city printed on it. He had a program, a direction. Without it, the train was useless to him. It was, in fact, an obstruction. He was lost without the software," Rose said.

In part because the development of software packages involves people rather than machines, the attendant policy issues that must be considered by the courts and in Congress are complex, Rose stated. Two areas being addressed in both these places now are copyrights and privacy, he added.

Rose questioned in particular whether industry should have the right to take public-paid-for information and process it into private software packages, copyright it and sell it back to the government.

"On the other hand, when a professional programmer initiates a package of information which is innovative and useful, combining various aspects of software technology such as indexing and abstracting, it does seem fair to reward that individual with a copyright," he noted.

While the congressman said he did not know how the questions of copyrights for software or of software patentability will be resolved, he expects the new copyright laws being written in Congress and future court rulings on software patents to deal with these problems – and quite possibly in the industry's favor.

CW
At Acpa

Rose noted everyone in the audience knew of the abounding dangers concerning privacy. Attempts to protect privacy are fallible, he said.

But "if we are ethical about the kinds of information we put into data bases, and if we are careful to include only the essentials about individual lives, we may find we do not need to worry so much about protection," he said.

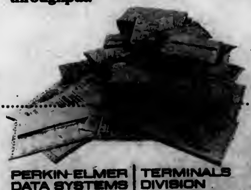
Finally, Rose urged his listeners to follow all congressional attempts to set policy in connection with the industry. "We make mistakes and misjudgments. We are ordinary citizens like the rest of you and these new inventions are taking us into a world we do not understand either. We are doing the best we can with what we know and what others tell us," he reminded them.

The congressman suggested the programmers and analysts begin their coverage of activities on Capitol Hill by following hearings on the various "Bell Bills" being held by the House Subcommittee on Communications, chaired by Lionel Van Deerlin of California.

Only Perkin-Elmer Terminals give you power front forms insertion.

Take any multi-part business form – bottom glued or unglued – drop it into our front forms insertion device. At the touch of a button, your form will feed automatically. That's it. No alignment problems. No forms separation or tearing. And because it's power-driven, it increases operator throughput.

Carousel . . .
more than a printer.



PERKIN-ELMER DATA SYSTEMS | TERMINALS DIVISION
Randolph Park West, Route 10 & Emery Avenue
Randolph, NJ 07801 201 366-5550 TWX 710-987-7913
Overseas, call: 44895-52441 Uxbridge, UK
887-1000 Sydney, Australia
416-677-8990 Mississauga, Ontario, Canada

Yes. I want the terminal that can handle my forms.
Name ________ Title ________
Company ________ Phone ________
Address ________
City ________ State ________ Zip ________
Estimated No. of Units ________
Interested in handling: ☐ ledger cards ☐ multipart forms ☐ multipart continuous forms ☐ automatic feeding and stacking documents and certificates ☐ independent journaling and forms printing ☐ alternate type fonts (Specify) ________

GENESIS ONE
COMPUTER CORPORATION
an MAI company
300 East 44th Street, New York, N.Y. 10017

One of the many leading companies you'll see at Computer Caravan 77.

Genesis One Computer Corporation will display its line of high-performance, low-cost Display Terminals and Printers. In wide use throughout the U.S. and abroad, the Genesis One® peripherals have proven their reliability and total plug-in compatibility with the IBM 3270. The units also offer many extra features which provide excellent price-performance advantages.

COMPUTER CARAVAN 77

The traveling computer exposition and forum sponsored by *Computerworld*
797 Washington Street, Newton, MA 02160
(617) 965-5800.

San Francisco • Los Angeles • Cleveland • Minneapolis/St. Paul
Chicago • New York • Philadelphia • Washington, D.C. • Boston

Cost-Control System Suggested To Involve Entire Firm in DP

By Don Leavitt
Of the CW Staff

ATLANTA – Because the effective use of DP resources hinges on the involvement of all affected groups within a corporation, a coherent system of cost control may be the mechanism to provide that involvement, according to a consultant for Arthur Young and Co.

Corporate, operating division and computer center management each have opinions of what constitutes DP "performance" and each can be motivated to contribute to that performance, William Sherer told a Computer Measurement Group (CMG) session here last week.

Cost information per activity is a "common denominator" understandable to all parties impacted by DP; a system that encompasses expenses, system activities and planned personnel and machine changes might well bridge the communications gap that often exists between these groups, he added.

To be effective, however, the cost-control system must be designed around the needs of the groups involved, he warned.

CW At CMG

Senior management is responsible for deciding what functions have DP potential and for keeping the computer center activities in balance with efforts of the rest of the organization, Sherer reminded the group.

But it is departmental or division managers who have responsibility for the final output of the information from the computer center, he said, adding responsibility in this instance is defined not in the technical sense of efficient operations per se but in the general sense of cost per job performance.

The operational manager is in the best position to judge the computer-generated output and its value to his own area, but there are subjective factors that influence the thinking of many of the managers at this level, Sherer said.

The manager has to be concerned about the service level – the turnaround or response time – he can get from the data center. But the tuning done by the DP technicians is invisible to him.

In much the same way, concern for reliability of results is natural, but this is out of the control of the operational manager, he added.

The computer center management is much closer to the specific work than the other groups. A cost-control system would reveal the real costs of current projects, applications development work and even some possible configuration changes, Sherer noted.

There are four components in an activity-costing system, he went on. The definition of each responsibility center is one of those components and there are no hard and fast rules for deciding which portions of DP activity need to be set up as such centers.

But, he said, there are three broad categories of work that can be subdivided into unique responsibility centers. "Routine" labor works with data entry, processing and output functions, while "nonroutine" labor encompasses the professional DP staff. The third category covers the work done by the equipment itself, Sherer explained.

Once the centers are identified, the next step in the development of a cost-control system is the association of costs with the activities within the centers, he said. Costs are either direct or indirect, he noted, and assignments can become confused when a particular user has dedicated resources.

Measuring activities' performance provides an indication of how much work was done by each responsibility center. Many of the activities are easily definable and measurable, but others – particularly those done by the nonroutine labor force – are less clear, he acknowledged.

But, one way or another, they can finally be isolated and computed, he said.

The final piece of the puzzle leading to a coherent cost-control system is setting rates for the various activities. Sherer reminded the CMG session that systems might be built around either actual or standard rates; actual rates might seem more reasonable, he admitted, but standard rates normally lead to more consistent billings.

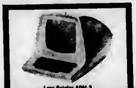
That tends to make that approach more acceptable to the end user, he added.

Behind every terminal you buy from us...

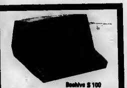
there's a great group of people you can call when you need them!

Our representatives want to make sales, but they want to make happy customers, too. So they do everything possible to assure you're getting terminals that are compatible with your system. What's more, they don't disappear after the sale. You can depend on CPC people to provide the back-up you need for maintenance and service on any make terminal we sell you.

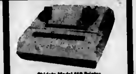
For a fast response from anywhere . . . call us toll free at 1-800-243-9280.


Lear Seigler ADM-3

Beehive S 500


Beehive S 100

Lear Seigler ADM-1


Okidata Model 110 Printer

Lear Seigler ADM-2

MI² 180 character Printer and 1200 Baud Full Duplex KSR Terminal

Computer Peripheral Corp.
1225 Connecticut Avenue, Bridgeport, CT 06607
Gentlemen: ☐ Please send complete data on the CP line of terminal products. ☐ Please have a representative call.
Name ______ Title ______
Company ______ Dept. ______
Address ______
City ______ State ______ Zip ______

Dealer and distributor inquiries invited.

Computer Peripheral CORP.
1225 CONNECTICUT AVENUE • BRIDGEPORT, CT 06607 / (203) [illegible]

Illinois Inviting Citizens to 'Beat Bum Rap Sheets'

By Catherine Arnst
Of the CW Staff

CHICAGO – If you live in Illinois and think you've gotten a bum rap, the state's Law Enforcement Commission is willing to help you beat it.

Illinois has circulated posters and brochures telling persons with arrest records how to go about inspecting and if necessary correcting both the computerized and paper criminal history files kept on them.

Since the program was started March 15, approximately 80 files have been requested and 75 were found to have errors, according to Art Loos, systems superintendent of the Illinois Bureau of Identification.

To check an arrest record, a person must identify himself at any police station or sheriff's office and fill out a "Request for Access and Review." A fee of not more than $10 can be charged for processing the request.

Challenges on Errors

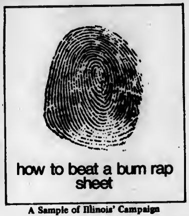
Within six weeks, written notice of an appointment for inspection of records is sent, and the person returns to inspect the record. If any errors are found, the individual can file a "Record Challenge."

If the application is denied, an administrative review can be requested. If still not satisfied after this procedure, an individual can file an administrative appeal with the Illinois Criminal Justice Information Systems Council. The council's decision is final unless a civil suit is filed.

Statewide Terminals

The Bureau of Identification maintains 1.8 million records on 100,000 people in its criminal justice information system. Records are corrected and updated through any one of 32 Incoterm terminals located in police stations throughout the state, Loos said.

At the end of October, the state began systematically purging from its files all records on people 70 years or older who have not had an arrest in 10 years; this procedure will take about three weeks, he said.


how to beat a bum rap sheet

A Sample of Illinois' Campaign

Beleagured Bill for Mass. Justice System Signed

By Nancy French
Of the CW Staff

BOSTON – A bill authorizing $250,000 for the next phase of this state's computerized criminal justice information system was signed by Gov. Michael S. Dukakis here recently after a year-long struggle that threatened to delay the project indefinitely.

The bill was originally proposed as an appropriation to match federal Law Enforcement Assistance Administration (LEAA) funds on a 90%-10% basis.

The measure was defeated by this state's cost-conscious legislature, but after Dukakis and Attorney General Frank Bellotti got behind it and the system was thoroughly explained to the legislators, it was passed, according to Frank Keefe, systems engineering director for the Massachusetts Committee on Criminal Justice.

Specific Costs Cited

The bill approved by the legislature provides a very specific appropriation to be paid out of the capital outlay budget – a measure legislators were able to come to grips with, Keefe said. It allocates state funds for 50% of the cost of new work at the computer site and 10% for renovation, he explained, and contains actual bid information provided by contractors.

Despite the setback that threatened to kill the project, conversion of criminal records never was discontinued, Keefe said, although he was unable to estimate what percentage of the records have been converted to date.

'Effective Half the Time

He did say, however, that when the criminal records data base goes up it will be able to respond to about 50% of the inquiries police will make. Within two or three years, that percentage will edge up to 80% or 90%, he added.

"It's been a hair-pulling, teeth-pulling type of effort" – not because people objected to the concept, but rather because of a problem with constitutional separation of powers between the state's three branches of government, he explained.

The problem goes back to a ruling by the state's Supreme Judicial Court which stated that any management data furnished by the courts could not go to an executive agency to be manipulated, he said.

While about 48 of the 50 states maintain criminal justice information within the executive branch, Massachusetts criminal records reside in the judicial branch.

After a statement of understanding was drawn up between the executive and judicial branches that defined how the data would be used and described how the Probation Central File was to be automated, the project began to move forward.

The criminal justice system is still a long way from completion, Keefe said. The $250,000 appropriation "will give us somewhere to put the Burroughs B-6700 system while programming work is completed by Data Architects, Burroughs' subcontractor in the project," he added.

The system is expected to be up and running with acceptance tests completed within about 18 months, he said.

Charity begins at home.

You're giving expensive machine time away – plus core, disk space, I/O resources and throughput – if you still use the sort that generally comes with your 360/370 computer.

All those system resources cost lots of money – money your company can use just as well as the hardware manufacturer, maybe better.

Charity begins at home – and that explains why every month more than 100 new users around the world install CA-SORT.

Our sort package will save you large chunks of machine time and I/O resources. Disk space, too – up to a whopping 50%.

It'll optimize your system utilization, give your other programs a chance to run. That means greater throughput and that means still more savings.

The busier your computer becomes, the more you need CA-SORT. Let us prove it. You're cordially invited to try CA-SORT without obligation.

We'll install it in 10 minutes, less if you're on DOS. No fuss – no interruptions. Designed for DOS, OS, DOS/VS and OS/VS systems. Start right now to stop the costly drain on your resources. Mail the coupon today.

New York City
655 Madison Ave.
New York, N.Y. 10021 (212) 355 3333

☐ Call me, I'm interested
☐ Just send information about CA-SORT 77

Name ______
Title ______
Company ______
Address ______
City/State/Zip ______
Telephone (area code) ______
Computer ______
System ______

New York City
655 Madison Ave.
New York, N.Y. 10021
(212) 355 3333

Atlanta
965 Virginia Ave.
Atlanta, Ga. 30354
(404) 763 4413

Chicago
800 E. Northwest
Highway, Suite 330
Palatine, Ill. 60067
(312) 358 7770

Los Angeles
P.O. Box 2667
Culver City, Calif. 90230
(213) 649 3623

Washington D.C.
Government Services
1730 N. Lynn Street
Suite 400
Rosslyn, Va. 22209
(703) 790 9749

Germany
Computer Associates GmbH
Ahastrasse 5, 61 Darmstadt
(6151) 650 71

Switzerland
Computer Associates A.G.
Stampfenbachstrasse 5
CH-8037 Zurich
(01) 60 42 52

Holland
Computer Associates B.V.
70 Heemraadsingel
Rotterdam 3003
(10) 77 24 99

Belgium
Computer Associates S.A.
70/bte 12 chaussée de
Charleroi, Bruxelles 1060
(2) 538 95 91

Representatives worldwide: Austria, Canada, Denmark, England, France, Italy, Japan.

COMPUTER ASSOCIATES

TEXAS INSTRUMENTS PORTABLE TERMINALS

$1,795!! or $62.83/Mo.*

w/carrying case & coupler

WESTWOOD MODEL-743W

FAST DELIVERY-TRADE DISCOUNTS

BICENTENNIAL SPECIAL — 5 EACH @ $1776
(Limit 5 per Customer)
Other Models Available Now:

T.I. 725 Portable
T.I. 733 ASR
T.I. 743 KSR
T.I. 745 Portable

Also Available:
C.R.T.'s & Impact Printers

WESTWOOD ASSOCIATES, Inc.
1442 Broad Street
Bloomfield, New Jersey 07003

(201) 338-0200 (212) 964-3018
*3 Year Lease

Mass. Makes Move in Haste, But May Soon Repent in Leisure

By Nancy French
Of the CW Staff

BOSTON — Massachusetts officials who moved the state's tax computer from a shared DP facility to function as a dedicated system to comply with "pending tax legislation" may soon find they acted in haste.

Neither the Tax Reform Act of 1976 nor the Internal Revenue Service (IRS) regulations that will implement it will contain new confidentiality requirements, according to congressional and IRS spokesmen.

The computer was moved at a cost of $20,500 when Tax Commissioner Owen L. Clarke was told by a congressional employee that confidentiality provisions contained in the Tax Reform Act could not be met in a shared DP facility.

The rules in question were those written to protect the confidentiality of federal tax return data the IRS provides on computer tape to states to help them locate residents who don't file state tax returns [CW, March 29].

In jeopardy was an estimated $10 million generated from such delinquent taxpayers, officials confirmed.

Although the computer had been moved to the central site only a few months before from a location where it had functioned as a dedicated system, it was moved back without waiting to learn what the ultimate IRS regulations would be.

Consolidation Urged

The story began some months ago when a report from a Management Task Force appointed by Gov. Michael S, Dukakis recommended consolidating the state's DP facilities. The consolidation measure, aimed at saving money in this revenue-starved state, was considered by the previous administration but tabled for reasons that were not explained, according to Roger Banville, director of the central DP facility.

The state's Univac 1100-10, which was being operated in the Tax Department, was ordered moved to the central facility by Administration Secretary John R. Buckley. There it would continue to be used for tax processing, but excess machine time would be used for other state functions.

Then Clarke learned from a staff member on the Joint Committee on Internal Revenue in Washington that the Tax Reform Act might affect these plans. The bill contained a clause permitting states "currently" sharing computers to continue to do so as long as Treasury Department regulations were observed, but did not mention anything about states that might wish to consolidate their DP operations in the future, Clarke explained.

The staff member interpreted the language as meaning that although states already sharing a system could continue to do so, states that were not would be prohibited from beginning the practice, Clarke explained.

Didn't Wait For Regulations

On the strength of that interpretation, according to Clarke, the decision was made to move the computer back, although the bill had not yet been signed nor had any IRS regulations been issued.

An IRS spokesman whose job it is to draft regulations to implement the new tax bill called the interpretation "incorrect." The rules, to be issued soon, will contain the same confidentiality safeguards presently in force for shared facilities; no dedicated systems will be required, he said.

Confidentiality rules presently permit states to use IRS exchange tapes as long as state tax department employees are present at all times during processing, the IRS spokesman explained.

As a result of the move, the state's central DP facility was stripped to only one system — a batch-oriented RCA Spectra 70/65 — to process all budget work for the controller, civil service personnel records and statutory retrieval for the legislature, to name only the major jobs, according to Banville.

While the Spectra 70 has communications and remote job entry capabilities, the data must be batch processed at night to update the files, he noted.

Short of computer power, DP officials have begun a search for a new system with data base capability, Banville said, adding "we've already had one meeting with the vendors and we're in the process of getting functional specs together so we can get the bids out by the end of the month."

COMPUTER MANAGEMENT
United Kingdom

World rank as DP market: *Fourth*
1975 DP expenditures: *$2.7 Billion*
1975 imports from US: *$270 Million*
Rank as importer from US: *Third*

Computer Management is a monthly magazine recently purchased by Computerworld, Inc. Monthly circulation is 30,000.

COMPUTERWOCHE
Germany

World rank as DP market: *Third*
1975 DP expenditures: *$3.7 Billion*
1975 imports from US: *$274 Million*
Rank as importer from US: *Second*

Computerwoche is a weekly tabloid newspaper started by Computerworld, Inc. It has a circulation of 21,000 to the West German computer community.

SHUKAN COMPUTER
Japan

World rank as DP market: *Second*
1975 DP expenditures: *$4.6 Billion*
1975 imports from US: *$189 Million*
Rank as importer from US: *Fifth*

Shukan is a weekly tabloid newspaper, jointly owned by Computerworld and Dempa publications. Circulation is 35,000.

Zero-Un Informatique
France

World rank as DP market: *Fifth*
1975 DP expenditures: *$2.5 Billion*
1975 imports from US: *$223 Million*
Rank as importer from US: *Fourth*

Computerworld represents **Zero-Un Informatique** in the U S Zero-Un has three publications, one a weekly tabloid newspaper with circulation of 22,000, the second a monthly magazine, circulating 13,000 copies, and a new bi-weekly, Minis and Micros. All circulate throughout Europe's French speaking computer market.

DATANEWS
Brazil

World rank as DP market: *12th*
1975 DP expenditures: *$250 Million*
1975 imports from US: *$60 Million*
Rank as importer from US: *(Est) 10th*

DataNews is a bi-weekly tabloid newspaper in Portuguese with an English-language summary. It is owned by Computerworld, Inc. and has a circulation of 7,000.

Now you can advertise in five leading computer publications, in five major export markets — in one simple step.

Computerworld now has sister publications in five leading international markets for US computers and computer-related equipment. These publications are operated and edited by local experts, and published in the language of the computer people they serve. And they do an excellent job of covering their markets.

To advertise in any of these publications, all you have to do is contact us at **Computerworld.** We can take care of everything, including translation and resetting of your English-language ads. And our International Marketing Services Division can also help you arrange a broad range of marketing services, from market potential studies to marketing operations set-up.

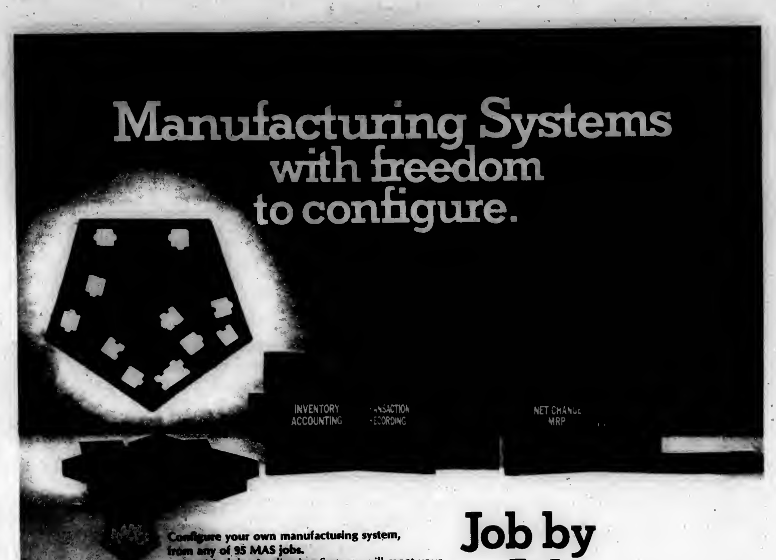
Just send in the coupon, and we'll send you all the details — including market facts on each country.

To: Mike Young, *Sales Manager*
International Marketing Services Division, Computerworld, 797 Washington Street, Newton, MA 02160
(617) 965-5800

I'm interested in your rate card and market facts for the following:
☐ SHUKAN COMPUTER, Japan
☐ COMPUTERWOCHE, Germany
☐ DATANEWS, Brazil
☐ COMPUTER MANAGEMENT, United Kingdom
☐ ZERO-UN INFORMATIQUE, France
☐ **I'd also like information on your marketing services.**

Name__________ Title__________
Company__________
Address__________ City__________
State__________ Zip__________ Phone__________

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY



Manufacturing Systems with freedom to configure.

Job by Job.

Configure your own manufacturing system, from any of 95 MAS jobs.

Modular Application Systems will meet your **BUSINESS NEEDS:** already proven in over 500 world-wide implementations. MAS was designed by personnel with backgrounds in manufacturing, production, engineering and cost accounting.

The bill of material-like structure of MAS (6 systems, 20 elements, 95 jobs) provides complete **FUNCTIONAL FLEXIBILITY.** You select only the functions needed to meet your initial objectives; then plan a phased implementation, safe in the knowledge that the interfaces are proven. As your experience with MAS grows, you can switch in new facilities, add additional control and tune the system from a wide *choice of policies*.

Just as MAS provides functional flexibility, it also allows **TECHNICAL INDEPENDENCE.** MAS is running on IBM, Honeywell, Univac and ICL machines; is used for distributive processing and on-line inquiry; and is supported by VSAM, ISAM, TOTAL, IMS, IDMS, DBOMP and CFMS. Totally Modular ANS COBOL allows complete freedom for efficient *customizing* by your own shop, or by us—*if required.*

MAS provides a **COST EFFECTIVE** way of achieving a proven functionally viable system for as little as 80¢ per line of code, including full documentation. Budgetary flexibility is enhanced as you select, implement and purchase your systems at *the job level.*

Almost without exception, every one of the 500 MAS systems installed is still in use. This success has been achieved through MAS itself, and a strong commitment to **IMPLEMENTATION SUPPORT.** Our implementation people are just as likely to have manufacturing backgrounds as data processing. With MAS Documentation and Training Aids, we'll work with you to ensure successful implementation.

For More Information: We'll gladly send our Manufacturing Systems Checklist which will enable you to check out MAS' ability to meet your requirements. Please contact Dick Nemerson, MMDS Headquarters, 300 East Joppa Road, Baltimore, Md. 21204 (301) 823-1600.

Mail to Dick Nemerson, MMDS Headquarters
300 E. Joppa Road, Baltimore, Md. 21204

Please send your: **Manufacturing Systems Checklist**

Name ____________________

Title ____________________

Company ____________________

Address ____________________

City __________ State ______ Zip ______

Phone ____________________

Martin Marietta Data Systems

We Build & Run Systems

Employee Motivation Seen Key To Outcome of DP Projects

By Ann Dooley
Of the CW Staff

CHICAGO – Unless workers on a DP project are motivated to do their jobs, the project itself will suffer or even fail, speakers at Info '76 agreed here recently.

Management style is the way "of getting your people to do the things you want" and, in order to achieve that, management has been turning toward the behavioral sciences, according to Lemuel Jones, an IBM instructor.

The Human Connection

Citing the theories of several behaviorists who contend people are motivated by various needs, Jones said it is up to management to encourage the fulfillment of those needs,

Behavior is closely linked to the job environment in several ways, Jones noted. People have various wants and needs; and as each level of need is satisfied, it is no longer a motivating factor, he explained.

Each level becomes more sophisticated; the last level is the need for self-actualization – living up to one's potential, according to Jones.

In relation to a work situation, this means the need for more job challenge and fulfillment, he explained.

Self-image is the most important force for actualization, Jones said. "Once managers realize workers have a self-image, they will do a much better job of managing them," he contended.

The role assigned to each worker should equal his self-image, Jones said. It is just as defeating to assign an unimportant task to someone with a high self-image as it is to assign an important task to someone with a low self-image, he added.

Encouragement or training from management might be required to build up an employee's weak self-image, he said.

A worker's self-image will promote a self-fulfilling prophecy, according to Jones. If an employee thinks he does a good job, he will do one; the expectation he, or his boss, has of himself will lead him to act accordingly, Jones explained.

Many managers still believe in the "Kick in the Pants" (Kita) theory of motivating employees, while others reward them with fringe benefits, but neither really motivates an employee to work better, Jones said.

A Pittsburgh survey showed achievement and recognition made workers happy while an increase in salary or fringe benefits only made them less unhappy, he noted. "Job enrichment doesn't mean more things to do; instead, it means changing the quality of the job."

Managers can improve work situations by encouraging workers to achieve their full capacity, by getting more feedback on management style, by delegating more responsibility and by implementing career planning and counseling, Jones said.

User Standpoint

Lloyd Epstein, manager of education for Cogna Systems Corp., approached motivation from a user standpoint, saying what is needed is total commitment to user involvement.

A project to put terminals in every installation of Swift Co., a meat processor, included feasibility studies, hands-on training for each person and extensive follow-up with the people at Swift. Two-way communication was encouraged and every effort was made to closely involve the client in the conception, design and implementation processes, Epstein said.

"The company felt the pride of ownership, which is a high motivator, and the client involvement created a commitment to the project," he recalled.

A mindful management is one which thinks about what people want, Ed Musselwhite, vice-president of Deltak, told the audience. "If there is no positive attention, they will accept negative attention; it goes on daily in industrial sabotage and projects which are endlessly delayed for no apparent reason," he said.

Emery Freight is a company that used positive reinforcement with dramatically successful results, according to Musselwhite. Instead of using the Kita philosophy, floor managers were told to praise and encourage the work of each individual.

Within a day, waste was significantly reduced and profits began a continued climb, he said.

MIT Jilted IBM, Trial Told

By Catherine Arnst
Of the CW Staff

NEW YORK – When MIT needed a more powerful computer for Project MAC, a time-sharing system brought up in the mid-1960s, it purchased a system from General Electric (GE) rather than IBM despite IBM's gift of a free computer some years earlier, according to Philip Morse, MIT professor emeritus.

In testimony at the U.S. vs. IBM antitrust trial here recently, Morse, director of MIT's Computational Center from 1957 to 1967, said he proposed IBM donate a 704 vacuum tube computer along with maintenance as "mutually advantageous to both of us."

The corporation saw other advantages in gratis installations at universities, trial documents entered earlier by the government showed. Free installations were believed valuable because they exposed management people to IBM computers at universities that had cooperative programs with the industry.

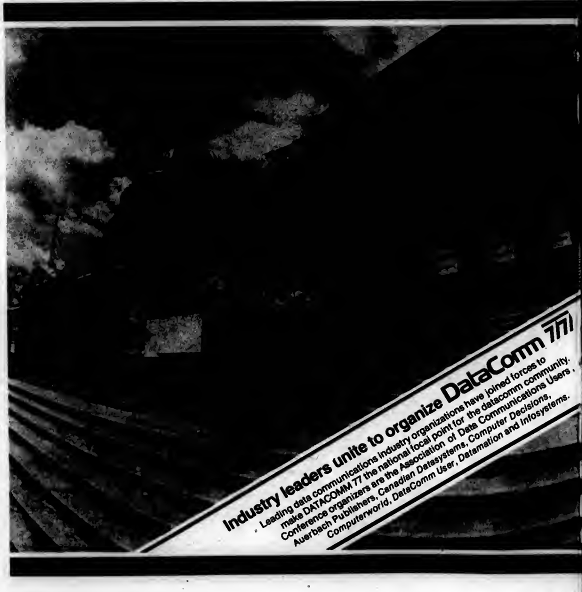
In addition, IBM assumed that, by offering equipment gratis, it would be in a preferred position with the receiver. A gratis installation at the University of Illinois had proved that assumption correct when the school later purchased more IBM equipment.

MIT, however, did not live up to IBM's expectations. When the school began Project MAC, it wanted a duplicate of its computer center system.

It needed a more advanced machine, however, and IBM was not far enough along in time-sharing developments to offer one, Morse testified.

IBM was "shocked and chagrined" that "any part of MIT would get a machine other than IBM's," Morse said.

Be where the
in data com



Industry leaders unite to organize DataComm 77
Leading data communications industry organizations have joined forces to make DATACOMM 77 the national focal point for the datacomm community. Conference organizers are the Association of Data Communications Users, Auerbach Publishers, Canadian Datasystems, Computer Decisions, Computerworld, DataComm User, Datamation and Infosystems.

DP Hit for Ignoring Corporate Decision-Making Needs

By Nancy French
Of the CW Staff

CHICAGO – The DP community has historically focused its attention on the current status of information and devoted very little attention to the information needed by top management for "strategic decision making."

Most management information systems (MIS) are only operating information systems – they tell what happened yesterday and what's happening today instead of what will happen tomorrow, according to Paul Schneider, vice-president of A.T. Kearney, Inc., a Chicago management consulting firm.

"Instead of focusing on what the cost impact of proposed legislation will be, for example, the typical [MIS] answers questions like 'How many orders did we receive yesterday?' and 'When do they have to be shipped?' " Schneider explained.

Orders are very important, but there will be no orders if management doesn't have access to information that answers questions like what impact new technology is going to have on the product line, he pointed out.

Other critical questions on the minds of top management include how changes in the equity market and the interest rate, for example, will affect the company's operation in the future, he said.

Equally important are answers to the questions raised by changes in competitors' product lines, he added.

Today's corporate executives are concerned about MIS because of the profit impact, but they don't like to turn to DP to get that information because DP doesn't have the answers, he told attendees.

Conceding that management is to some extent an art, Schneider said many executives can make decisions with less than the necessary information.

The artistic manager often functions well without the information he needs. Even if provided the information one would think he needs, the talented manager often chooses not the first choice suggested by a forecasting model but, rather, the fourth or fifth choice because of factors that cannot be quantified, Schneider indicated.

Assisting Top Management

Nevertheless, more can be done with DP to assist top management, and DP managers should urge their corporate higher-ups to invite them into the planning process – to let them know what information they will need to develop overtime so the DP department can avoid trying to throw together an MIS on a crash basis, he said.

The information management function still isn't being handled today; it's a future frontier, an opportunity, Schneider said.

The DPer of the future will know where to get the information his management will need to maintain flexible management objectives and to improve productivity in times of a capital crunch.

The DPer of the future should be able to help management recognize and exploit new areas of growth and anticipate changes in the economic system, he said.

Further, the DP department should be called upon to provide information that will assist top management in adjusting services to the changing demands of areas served by the company as well as help management take advantage of new products and new market opportunities, he said.

"Most of us grew up with the idea that the higher an individual was in the management structure, the less information he needed. This inverse relationship doesn't always work," Schneider said.

A DPer should be in tune with the personality and management style of the individual at the top of his firm, he said.

If he wants to know how many playpens are being purchased for the company's new day care center, the information provider must be able to provide it in the form he wants, Schneider concluded.

Bureau Negotiating To Stay in Business

OKLAHOMA CITY, Okla. – Losing a $30,000 per month account and owing $300,000 on a Honeywell 3200 may force Academy Computing Corp. here out of business.

The service bureau was doing $800,000 in business annually until January when Bellstar, an order tracking system it operated for AT&T, went in-house.

The system consisted of 250 terminals in 10 states and used 80% of Academy's computing power, according to Dr. James R. Sherburn, Academy's president.

Academy had been operating Bellstar since 1968. During last year's recession, however, AT&T decided it could operate the system cheaper itself, Sherburn said, adding he disagreed with AT&T.

AT&T accomplished the changeover in six months, leaving Academy with a large computer it didn't need and couldn't afford.

Honeywell, however, refused to renegotiate Academy's contract unless the vendor had a secured note guaranteed by a director of the service bureau. Sherburn said such a note cannot be provided.

The firm was officially placed in default by Honeywell early last month and the two companies started final negotiations about two weeks later. If no agreement can be reached, Honeywell will repossess the system and Academy will be forced to liquidate.

"Honeywell is not trying to put us out of business. It's merely a financial consideration," Sherburn said. "There are a lot of computer companies out there in our situation, I guess."

action is
munications

DataComm 77 ANNUAL CONFERENCE AND EXPOSITION, WASHINGTON, D.C., MARCH 9-11, 1977

Organized by:
Association of
Data Communications Users
Auerbach Publishers
Canadian Datasystems • Computer Decisions
Computerworld • DataComm User
Datamation • Infosystems

Join us for the data communications conference you don't want to miss . . . your annual national conference organized by the industry leaders.

That's DATACOMM 77. It promises to be the biggest, best, and most information-packed conference we've put together yet.

Program planners have taken full advantage of the Washington, D.C. conference site to arrange an outstanding series of special sessions dealing with governmental data communications. You'll hear about datacomm procurement within the federal government. You'll learn how data communications works for the military and for federal, state, and local governmental agencies and about systems for information exchange between agencies. You'll also have opportunity to express your views at our unique evening "Town Meeting" with FCC officials. In addition, you'll be brought up-to-date on legislation and other activities taking place right now in the nation's capital.

All this in addition to helpful and informative sessions on planning, implementing, and managing data communications . . . plus workshops and discussions on the latest developments in datacomm applications with special emphasis on distributed data processing and networking.

You'll also see what's new in datacomm products and services. Leading vendors have signed up for participation in the DATACOMM 77 Exposition. It's a great opportunity for you to gather first-hand information. To compare product features and capabilities. To get the data you need to make critical purchase decisions.

Bring your spouse! Our unique Spouse's Program features guided tours, other activities arranged exclusively for our DATACOMM family. Included are major Washington attractions and exciting peeks behind the scenes not offered on public tours.

Dr. William A. Saxton, Publisher of *DataComm User* and Conference Chairman, together with *DataComm User* Editor Morris Edwards, Program Chairman, invite you to join your colleagues for the annual national conference and exposition organized by datacomm industry leaders, for all datacomm interests. Be where the action is . . . DATACOMM 77, Sheraton Park Hotel, Washington, D.C., March 9–11. Send the coupon now for details.

Dr. William A. Saxton

Morris Edwards

I'm interested...

Dr. William A. Saxton,
Conference Chairman, DATACOMM 77
60 Austin Street, Newtonville, Ma. 02160

☐ I may attend DATACOMM 77
☐ My company may want to exhibit.
Please send me more details.

Name ____
Title ____
Company ____
Address ____
City ____ State ____ Zip ____
Telephone ____

DataComm 77

2

SYSTEM/3 SCULPTURE
For Christmas!

For System/3 users only, this gold-finished plaster sculpture is a perfect paperweight/conversation piece for the computer room or office. Beautifully detailed, 8 inches long, just $9.95 each postpaid. Brian Productions, 2949 Southfield Rd., Xenia, Ohio 45385. Satisfaction guaranteed.

Taxpayers Sue School District Over 370 Acquisition

By John P. Hebert
Of the CW Staff

CONCORD, Calif. – The Mt. Diablo Unified School District may have to give up its IBM 370/125 if taxpayers here win a class action suit filed against the school district.

Scheduled for a hearing Jan. 17, the suit charges the 370/125 was obtained to replace an IBM 1401 without competitive bidding and with funds raised for another purpose.

Stuart A. Safine, attorney for the taxpayer plaintiffs, said the school's 1973 request for proposal (RFP) described the system from IBM 370/125 specifications.

Further, the funds used to purchase the system came from a 1968 $25 million bond measure intended for "supplying equipment or apparatus of a permanent nature" for the school building and grounds, not for the purchase of a computer system, he said.

Smith vs. Mt. Diablo Unified School District et al. was brought by Jerry Smith in May 1974 on grounds of misuse of the 1968 bond money [CW, July 17, 1974].

The case has bounced back and forth between courts here for the past two years on technicalities. In December 1974, a superior court judge threw out the case, stating Smith hadn't filed the suit before deadline.

But last March, the California Court of Appeals ruled the time limit doesn't apply to public agencies sued by taxpayers.

Officials Denied Information

In the suit, Smith alleged he sought information on the bid proposal in 1974, but school district officials "wouldn't give him information on how they based their [purchase] decision" or give him a copy of the contract, Safine said.

"They wouldn't show him anything." Smith, who is just "an interested taxpayer, screamed and yelled" and brought the case to court, the attorney added.

Although there is no suit against IBM itself, the suit asks IBM to take back the 370/125 and refund the $565,229 purchase price to the school district. Safine said he is also hoping to recover some of the maintenance costs incurred by the school district's DP center over the past few years, but that is not the object of the case.

During the discovery portion of the suit, the court found a Sept. 5, 1972 letter sent by James Merrihew, superintendent of schools at the time of the system's purchase, to IBM salesman James Obendorf asking him to place a 370/135 on order unless a Model 125 would be available before the requested delivery date, Safine said.

The IBM salesman is alleged to have given the school district's DP manager a specification sheet for the Model 125 configuration and to have asked that the IBM name and model numbers be dropped from the RFP.

Bid proposals from Burroughs Corp., Honeywell, Inc. and Univac were not considered because they could not meet the specifications set forth, including the delivery schedule, according to Safine.

Vendors and lessors of computer mainframes who bid on the system later wrote to the school saying it was clear the school district obviously wanted an IBM system, he added.

'Wired From the Beginning'

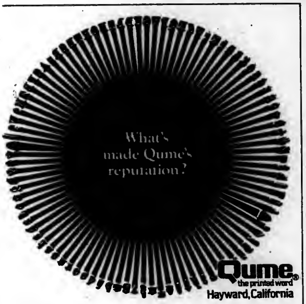
IBM installed the system and had it operating seven days after winning the contract, according to the taxpayers' attorney. IBM had specified a 10-day delivery schedule in its bid proposal, while the other three vendors submitted delivery dates of six months to one year, he said.

During the discovery portion of the suit, it was also found IBM had built the system for the school district before the RFP was issued and was merely waiting for the contract to be awarded, he said.

In addition, it was found the school district redesigned the computer room to accommodate the 370/125, Safine said, adding "I feel we can prove this thing was wired from the beginning."

And, he noted, school district officials admitted in the pretrial deposition it didn't need a machine with the computational capabilities of an IBM 370/125.

"We only want to get the school district's money back. We don't want to go after anybody in particular, or IBM for that matter," Safine said.



General DataComm Industries, Inc.
WILTON, CONNECTICUT

Just one of many leading companies you'll see at Computer Caravan 77.

Data Communications Network control will be the theme of the GDC exhibit. Their new Netcon-5 Network Diagnostic Control System will be displayed along with a complete line of modems, time division multiplexers, frequency division multiplexers and network appliques.

COMPUTER CARAVAN 77

The traveling computer buyers' forum and exposition sponsored by *Computerworld*
797 Washington St., Newton, MA 02160 • (617) 965-5800.

San Francisco • Los Angeles • Cleveland • Minneapolis/St. Paul
Chicago • New York • Philadelphia • Washington, D.C. • Boston

IBM Scientists Develop 'Supervacuum'

YORKTOWN HEIGHTS, N.Y. – As electronic circuits become smaller and smaller, new techniques are needed to apply ever thinner layers of materials to chips that will form the computer components of the future.

Scientists at IBM's Thomas J. Watson Research Center here have designed and built a vacuum chamber that enables them to form and study layers of material as thin as one atom, according to an IBM spokesman.

The chamber, which measures one cubic foot, is large enough to hold several experiments in a vacuum that approaches the emptiness of interstellar space, according to IBM.

The "supervacuum" is achieved by cooling the chamber to only a few degrees above absolute zero.

Observing Changes

To make computer chips effective, the thin layers of circuitry must be preserved over extended periods of time. In a test situation, scientists must be able to observe these layers and any changes that occur in the layer's electronic properties, according to Dr. William A. Thompson. In a normal vacuum chamber, the surface layers don't stay the same long enough to get a good analysis, he explained.

The supervacuum chamber enables researchers to do experiments over a two- or three-day period and then preserve the surface and analyze it again a month later, Thompson said.

Although the chamber runs at very low temperatures, it contains a unit hot enough to melt and evaporate materials such as lead onto test surfaces.

"One of the advantages of the chamber is that we can evaporate slowly without worrying about contamination. We get very good thickness control and surface longevity," Thompson said.

Designing the evaporator was one of the major tasks in the development of the IBM vacuum chamber. To preserve the low pressure of the chamber but, at the same time, allow the evaporator to function at a high temperature, it was necessary to surround the evaporator with four heat-insulating shields – two inner shields of tantalum and two outer shields of copper.

The chamber usually stays sealed for several months, during which many experiments are performed.

MISSISSIPPI STATE CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by the CDPA, 508 Robert E. Lee Bldg. Jackson, MS, 39202, up until 2:00 p.m. 12-20-76 for the following data processing equipment:

Request for Proposal No. 267 for the purchase of a microcomputer with graphics display capable of communicating with an existing DEC 1077 computer system.

Request for Proposal No. 268 for the purchase of an impact printer capable of interfacing with a Univac Uniscope 200 terminal.

Request for Proposal No. 269 for the lease or purchase of a software package that will edit in detail vehicle identification numbers (VIN) for both foreign and domestic vehicles.

Request for Proposal No. 270 for the lease or purchase of a central processing unit upgrade to replace two existing IBM 370/155 systems to include either a multi-processor (MP) 158 system and sale of 155's or an attached processor (AP) 158 system, sale of one 155 and purchase of a DAT (Dynamic Address Translation) feature for one 370/155.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Clyde P. Ballard, Executive Director
Central Data Processing Authority

New superfast CICS program aid beats "tube woe" -- ARGOS®

If you depend on CICS you need ARGOS for fast, dependable answers to CICS response time problems, stalls, abnormal terminations – a completely real time way to develop CICS systems that work reliably.

ARGOS dispenses with slow, costly batch techniques of CICS program development and problem solving. Easily installed in any CICS Cobol program ARGOS provides real ready-trace facility (in real-time execute), Source Program Retrieval without Terminal Switching, Display of Active TCA, Active CPU Job Display on your CICS terminal, Transaction Dumps at any point of choice – a real-time display of Last Program-ID and last 7 paragraphs executed on abnormal termination.

If you want more reliable efficient CICS a faster way ARGOS is available for Free 60-Day Trial to selected sites. Write to AUTOMATA RESEARCH INC. (The Software Engineers) for details on this amazing new productivity tool.

AUTOMATA RESEARCH INC. CWI
Suite 3302
350 Fifth Avenue
New York City, N.Y. 10001
Gentlemen: I want to know about ARGOS.

COMPANY NAME__________
YOUR NAME__________
TITLE__________
ADDRESS__________
CITY__________ STATE _____ ZIP _____
TELEPHONE__________

With DP Performed at the Source

Future Shops Seen Coordinating Distributed Processing

By Nancy French
Of the CW Staff.

CHICAGO – The typical DP department of the future will function as an internal consultant and coordinate DP afforts being undertaken by line departments, according to W. Harry Vickers, vice-president of Entrex, Inc.'s Market Development and Support Division.

In such an environment where processing is done "at the source," the data base administrator will specify the format of key data elements in all source data processing systems and will also specify the format of all intercomputer data transfers, he predicted.

Vickers urged DP managers as well as top management to be prepared. "If you wait until source data processing sneaks up on you, you'll end up with a hodgepodge of equipment with no one place to go for knowledge about overall operations" and with little flexibility, he said.

Distributed Processing Trend

Many trends already favor a move to distributed processing, Vickers told attendees at the recent Info '76 conference here.

Hardware cost has been in a very steep decline for a number of years and that trend is likely to continue, he said. The microprocessor has brought about dramatic cost Improvements and over the next few years will produce considerable speed improvements, he added.

The advent of semiconductor memory has pushed down the prices of all forms of main memory, and disk storage costs have dropped by a factor of 25 since 1970. Data communications costs have also dropped, although not nearly as dramatically as computer hardware.

These declines are occurring in the face of labor costs which are rising an average of 8% to 10% annually, he pointed out.

"In many places it is hard to find, train and keep quality people. The economics are saying: 'Use more hardware if it will save labor or if it will make labor more efficient or more effective," he said.

People are growing more comfortable with the computer, he addad, noting students are taught programming as a standard subject in most high schools and colleges. Further, with the maturation of software, minicomputers have many of the features only a mainframe had just a few years ago.

Another factor in the trend toward distributed processing is the movement to profit-and-loss-oriented department management, Vickers said. When a department manager becomes "sensitive to profit," he begins to look for tools to make his operation more efficient, he explained.

Insistence on Simplicity

The company president faced with a proposal for distributed processing should insist on simplicity so he, as well as the auditors and line managers, can understand it on more than a superficial level, Vickers said.

While it's not necessary to know how to program a whole application, line managers should know how the application works and how the data is structured so they can determine which questions will be easy to answer and which will be difficult, he explained.

A line manager might want to know something he thinks is simple, such as the top 10 overdue accounts, the 10 largest orders for the week or the 10 employees with the highest absenteeism rate, he suggested, adding this type of question will come up many times but usually "after the application is programmed."

It makes little difference to the manager if the page has a nice heading or the spacing is neat or even if he gets more than 10 names. He wants the information and he usually wants it fast, Vickers said.

There are source data processing systems today that will provide 95% of the functionality of a mumbo-jumbo system, but with a structure that can be explained to a non-DPer in terms of three concepts: a file, an index and a transaction, he said.

As for DP managers, Vickers recommended they regard source data processing "as an opportunity, not a threat." Some seem to be afraid it will put them out of jobs, he noted.

DPers should plan carefully and, as the first project, "distribute something that shows very tangible progress in a very short time."

Vickers also suggested involving the line departments in programming some of the reports. This will not only give them the ability to generate follow-on reports, but also increase their enthusiasm, he said.

FAA Upgrading Traffic Control System

SILVER SPRING, Md. – In an effort to improve its Enroute air traffic control system, the Federal Aviation Administration (FAA) is implementing additional software with upgrades done by Computer Sciences Corp. (CSC).

These features include a "flight plan probe" which automatically compares each flight plan with all others entered in the computer. The first aircraft to claim space will have precedence over the later entries.

"Conflict resolution" is a program to handle flight plan conflicts. Air traffic controllers will be able to view a display screen to compare possible solutions to conflicting demands for air space and reroute aircraft where necessary.

The controller might inform one pilot to reduce speed or altitude until a conflict has passed, according to a CSC spokesman.

A third capability is "command message automation," a nonemergency means of delivering routine messages from controllers to pilots through computerized voice or teleprinters.

The last feature will be "enroute traffic metering" to compute and improve the timing of aircraft arrivals at busy airports and adjust the flow of traffic into an airport.

These capabilities will enable the Enroute system to better utilize existing computers and avoid the expense of new equipment while increasing safety, especially near busy airports, according to Arturo Silvestrini, president of CSC's System Sciences Division.

The CSC software was designed to interface with the computers of the FAA's automated terminal system to optimize maneuver time and holding patterns that contribute to flight safety and fuel savings, Silvestrini said.

The initial safety features will cost taxpayers about $1.5 million, CSC said.

Anti-Puncher Defeated In Recent Election

Special to Computerworld

SEATTLE – A candidate who proposed to "abolish the punch-card voter system" in the state of Washington went down to defeat in the recent election.

Bob Corcoran, a Democrat running for Secretary of State, had called the computerized election procedures now used by 45% of Washington residents "dangerous and error-prone." He cited 1975 election results in which "one county's figures were totally wrong with a two-day lag in correcting the results" and in which "34,785 votes were not tallied in 12 other counties."

Despite Corcoran's charges, election officials have found punch-card voting to be no more "dangerous or error-prone" than voting on lever machines or with paper ballots.

The punch-card voting issue was the sole plank in Corcoran's platform, according to the official state voters' pamphlet. Victorious candidate Bruce Chapman, a Republican and the incumbent, did not mention the issue in the pamphlet.

The only other candidate for Secretary of State to submit a platform, Lucie Griswold of the Owl party, passed over the punch-card ballot issue in favor of opposing "bed wetting" and "postnasal drip."

The history of punch-card use in Washington, which began in about 1971, has been marred by such incidents as the resignation of the Superintendent of Elections for the state's most populous county in 1973 because of the "tension and pressure" created by the system.

DTL USERS

If you are currently using DTL devices in your product lines, and are seeing your prices going up, and your sources disappearing, perhaps we should get together. We are a manufacturer of equipment utilizing DTL and are attempting to form a users group to determine what can be done to satisfy our requirements in a marketplace where the suppliers are not sensitive to the needs of the industry that was a major factor in their growth. If you have concerns about our future needs and costs, please contact us at

CW Box 4827
797 Washington St.
Newton, Mass. 02160

Fast printing, instead of fast talking.

Qume® the printed word
Hayward, California

ramis

Just one of many leading companies you'll see at Computer Caravan 77.

Deliver fast, fresh planning information with RAMIS, a complete, automatic DBMS with comprehensive report preparation, records management and applications control capabilities and an English-like language that lets you tell the computer what to do, not how to do it.

COMPUTER CARAVAN 77

The traveling computer buyers' forum and exposition sponsored by *Computerworld* 797 Washington St., Newton, MA 02160 • (617) 965-5800.

San Francisco • Los Angeles • Cleveland • Minneapolis/St. Paul
Chicago • New York • Philadelphia • Washington, D.C. • Boston

Editorial

Promise and Peril

The recent introduction by IBM of its Advanced Communications Function (ACF) [CW, Nov. 15] puts an entirely new perspective on the company's Systems Network Architecture (SNA).

Up to now, SNA capabilities were limited to single-mainframe systems supporting terminals in various network configurations. Using the benefit of its flawless hindsight, IBM now reveals these systems really were single-domain networks.

The significance of a single-domain network is important only as it relates to the multiple-domain network. And with the introduction of the latter term, IBM finally unveils the first major concept that helps to explain what SNA is all about.

Bearing in mind that some of these latest concepts remain to be demonstrated, IBM now reveals the ACF framework will allow terminals in one CPU network to access applications programs from a "foreign" CPU network.

In other words, terminal domains can be defined which span multiple mainframes and, as long as a terminal is duly authorized within the predefined limits, it will be able to access a number of CPUs.

These so-called "cross-domain connections" will truly expand the networking capabilities of IBM teleprocessing users. And the multiple CPU network concepts appear to set the stage for data communications users who will be accessing multiple network facilities to access multiple data bases at distributed DP sites.

The IBM announcement holds much promise together with an unusual amount of caution to be carefully heeded by users.

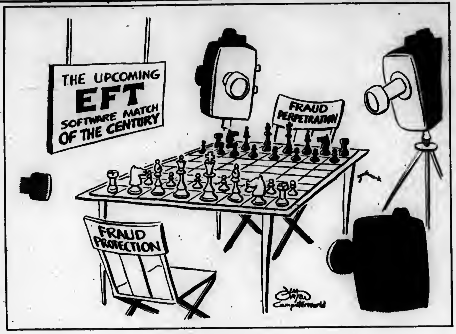
Until now, the SNA architecture has been an underwhelming success. This is mainly because IBM created an immensely complex operating environment which includes significant cost and configuration upheaval for those users that choose to implement it.

Previous SNA implementations have encountered a rocky road because many of the capabilities were announced before they were truly perfected. There are still precious few large-scale networks operating under SNA with IBM's Synchronous Data Link Control.

The ACF capabilities are the most impressive to date. They will become available next year. And if they operate as smoothly as advertised, the days of distributed data base networking using dispersed terminal subsystems and multiple CPUs will have taken a significant step forward.

It will be very important for users to carefully monitor additional technical details as they unfold from IBM. It will also be very interesting to see how soon there are test sites implementing the new SNA concepts on a large scale.

It could be very exciting.



Letters to the Editor

Schechter Showed Inventiveness And a Degree of Inaccuracy

In his article, "Storage of Data Information Lacks Inventiveness" [CW, Nov. 8], David Schechter has shown inventiveness, albeit inaccuracy.

His statement that centuries have 25 leap-year days was only partly correct, since century years not divisible by 400 are not leap years, e.g. 1900.

We have invented a date, dubbed Mega, which is the number of days since the beginning of the Common Era (A.D.). This is based on an assumption that the Common Era began on Jan. 1, 0000, according to today's Gregorian calendar.

July 4, 1976 becomes 721,905, which stores very nicely in four bytes, packed decimal. The Mega date transcends both years and centuries and can easily be used to calculate elapsed days and the day of the week.

Since the calculation to obtain the Mega date is a little complex, we use a subprogram to convert any of five date forms to any of six date forms, including Mega.

Larry Runtsch
Systems Programmer

Geo. A. Hormel & Co.
Austin, Minn.

Excellent Date Handling Method

David Schechter proposed an excellent method of handling calendar dates for the entire century. Hopefully, *Computerworld* will keep the idea alive by noting any pioneer applications.

Nonetheless, I strongly urge that Schechter's meaningless acronym, FDN (five-digit number) be replaced by DN (date number).

Kenneth K. Klingensmith

Cromwell, Conn.

Only Good for 23 More Years

David Schechter's article is commendable, but I believe his formula is only good for 23 more years.

I propose the following simple change to his basic premise: There are a fixed number of days in a 10,000-year period, namely 3,650,000 plus 2,500 leap-year days.

Thus, any date between Jan. 1, 0000 and Dec. 31, 9999 can be expressed as a seven-digit number (SDN).

SDN = (YYYY * 365.25) - .25 + DDD

In fact, an SDN would suffice for the years 0000 through about 27377.

Donald J. Ramig

Madison, Wis.

How Many Leap Years in 100?

It was the mistaken notion that there are 25 leap years in a century that led me to notice the error in David Schechter's five-digit number (FDN) formula.

For those concerned about the 21st century or truly archival data of this century, the correct formula is:

FDN = Integer ((YY * 365.25) - .25) + DDD

With this minor correction, you will be easily able to determine the correct number of days that items from the year 1900 have been on backorder.

Edward C. Imperatore

New York, N.Y.

(Other letters on Page 16.)

Data Past

Five Years Ago
Nov. 24, 1971

LAS VEGAS – About 17,000 people attended the 20th anniversary of the Fall Joint Computer Conference in this city last week and 4,100 conference registrants participated in sessions on "Computers and the Quality of Life," the conference theme.

President Richard M. Nixon, in a telegram, congratulated the American Federation of Information Processing Societies, the conference sponsor, on the theme, noting it "reflects the challenge of the next 20 years."

– – –

LAS VEGAS – Potter Instrument Co. led the product announcements at the Fall Joint Computer Conference with a working plug-compatible IBM 3330 replacement drive that interfaced directly with IBM's 3830 controller. The disk storage system, the DD 4330, was cheaper and faster than its IBM counterpart, Potter said. The single-drive spindle was priced at $550/mo on a one-year lease and the cost of the double-drive version was $1,030/mo.

Eight Years Ago
Nov. 27, 1968

WASHINGTON, D.C. – A spokesman for the General Services Administration (GSA) told a congressional committee here that if the GSA did not receive cost data from the computer industry voluntarily next year, it would promote legislation to force the industry to provide it.

Lawson B. Knott Jr., GSA administrator of general services, said while the Truth in Negotiations Act called for the details to be provided, the computer industry refused.

– – –

WALTHAM, Mass. – A desk-top computer display which handled both drawings and characters was introduced by Computer Displays, Inc. Designed to operate over standard telephone lines, the Advanced Remote Display Station sold for $12,750. It was said to be the first desk-top system that had both assembly drawing and full-vector capability.

Reader Commentary

Against Long-Established Usage

Schechter Gave Incorrect Definition of the Julian Date

By Peter F. Klammer
Special to Computerworld

Does one call a programmer a computer? Or a card reader a processor? No, these words have particular meanings in the realm of DP jargon; they have not been just carelessly adopted.

It is one thing to assign more precise roles to words used in a field of work or even to invent a few words to match our newly invented concepts, but it is quite another thing to misuse existing language that already has well-defined usage.

That is why I take such strong exception to David Schechter's description of the term "Julian" date in the Nov. 8 *Computerworld*. The definition he gave is incorrect and runs against long-established usage in the scientific arena.

First Modern Calender

The back end sheet of this year's *Success* desk calendar explained the Julian calendar was "the first modern calendar" with a leap year, established in 45 B.C. by Julius Caesar.

Although it was "an enormous improvement over all previous systems," it ran a little slow, by about 11 minutes, 12.2 seconds per year or 3 days, 2 hours, 41 minutes and 20 seconds every four centuries.

Of course, this doesn't mean the sun gets further and further from zenith on successive noons, as would be the case if one's wristwatch were allowed to accumulate such an error.

Out of Kilter

What it does mean is that the system of counting days, months and years gets further out of kilter relative to the seasons – marked by the equinoxes and solstices.

Without a correction, the shortest day of the year would be Dec. 21, then Dec. 20 and so on, until a few millenia later the middle of the northern-hemisphere winter would occur during September or October, and Dec. 22 would mark the start of spring.

Gregorian Leap Year Rule

Sixteenth-century stargazers were able to measure this error and they gave us our current Gregorian calendar. A calendar correction "was done in 1582 by Pope Gregory XIII," skipping Oct. 5-14. (Imagine what that would do to your payroll system – and your third-shift operator bewails the loss of an hour when the clocks go off Daylight Savings Time.)

> *'I take strong exception to David Schechter's description of the term "Julian" date . . . The definition he gave is incorrect and runs against long-established usage in the scientific arena.'*

To take up part of the error, the new Gregorian Leap Year rule provides for dropping a day from every centessimal year (ending in 00) whose number cannot be divided by 400.

That takes care of three days per four centuries, leaving something like one day per 4,000 years to be compensated for in the future; but it's quite likely the earth's rotation is slowing down enough that a new leap year rule will have to be instituted by then.

Note that not all the world adopted the Gregorian calendar at the same time. England and the American Colonies switched in 1752, by which time the error had accumulated to 11 days: Sept. 3-12, 1752 do not exist in the English-speaking world.

So even though it was Feb. 11 when George Washington was born in 1732, his birthday exactly 40 years hence was Feb. 22, 1772.

Since both the Julian and Gregorian calendars were in use simultaneously in different parts of the world," dates preceding the change are sometimes [suffixed] OS, for Old Style."

Adopted by Astronomers

Data processing folks were not the first to see the advantage of a day-numbering system that would allow easier calendar arithmetic. In fact, according to Van Nostrand's *Scientific Encyclopedia, Fourth Edition*, 1968, the term "Julian Day" refers to a system astronomers have adopted, "a system of chronological reckoning, using merely the mean solar day as a unit."

Further, "according to a system first proposed in 1582 . . ., a date is expressed as the number of days elapsed since the beginning of an arbitrary 'Julian era', Jan. 1, 4713 B.C."

Astronomers go on to put decimal pieces behind the day number instead of stating hours, minutes and seconds. "Thus, an event occurring at 2 hours, 43 minutes, 34.6 seconds p.m., Eastern Standard Time, on Jan. 24, 1937 would be recorded as . . . J.D. 2,428,558.32193."

The decimal part, of course, is relative to Greenwich Mean Time.

Webster's *Third New International Dictionary*, 1971, concurred, defining the term "Julian day number" as "the number of a day in the Julian day calendar" (as 2,436,934 for Jan. 1, 1960).

Here a mystery arises: every algorithm I have found yields 2,436,935 for this date. I have checked four other references such as Van Nostrand's and I think it is simply an error. Off by one again.

'Day of Year'

What shall we call the YY/DDD notation, then? I would suggest "Year and Day of the Year."

The term "serial day" is ambiguous, leaving the question, "Serial within what?" "Day of Year" is unambiguous, and one can answer "What day of the year is it?" by looking at the lower left corner of a better desk calendar.

This terminology also fits well with "day of the week" and "day of the month" terminologies.

Many good algorithms have already been published in *Collected Algorithms From CACM and Communications of the ACM* to convert Gregorian dates to other date systems.

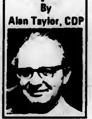
I prefer to use Julian dates unless I must be very stingy with space. A signed 32-bit integer will cover dates through nearly the 50,000th century, which is enough for almost any application but a Star Trek concordance.

Klammer is senior programmer/analyst at the Kansas City (Kan.) Department of Planning and Development.

With the New Role of the Auditor

DPers Must Get Ready Now for Real Data Base Life

The Taylor Report
By
Alan Taylor, CDP



When the National Bureau of Standards (NBS) was getting ready to publish NBS Special Publication 451, "Data Base Directions – The Next Steps," earlier this year, it had the delightful idea of showing the relationships between various areas by means of a jigsaw puzzle.

Regulations (which referred to government regulations and their impact) were shown as the chin and mouth – which appeared somewhat appropriate, all things considered. Technology was shown as the neck, on which everything else was based – which again was quite well thought out. Audit was allocated both the eyes and the nose – and that I found interesting.

Why a Nose?

It is easy to see why the eyes were allocated to audit operations. It looks at what is going on by inspection. This is its responsibility – and it requires eyes.

But why a nose? What is the symbolic function of the nose as seen by the NBS?

The answer came out in the audit part of the report. Here it was noted the auditors workshop reviewed problems which it felt will occur in the next five years.

The auditors did not simply look at the problems that are currently known; rather, they went ahead and sniffed problems that are not here yet.

The auditors were investigators here, rather than inspectors – and did a pretty good job of it too.

So the illustration of the auditors having the investigational smelling-out nose as well as the inspecting eyes was, in the circumstances, quite appropriate.

Auditors Looked Forward

In their investigation, the auditors noticed how fragile the data-based corporations were and how the increased concentration and reduced redundancy of data made it quite foreseeable that, owing to human error, a corporation could be simply wiped out.

They particularly rejected the concept that the chance of such a disaster wiping out a data base is so remote an auditor might not have the obligation to report any case where such a possibility existed.

More to the point, the auditors specifically differentiated the data base/nondata base situations at this point.

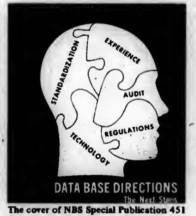
From their point of view, the move into data bases makes it apparently obligatory for auditors to investigate areas where they previously did not need to go – in this case, into the effectiveness of data base recovery areas.

From their statements, there was a consensus the depth of danger was such that the auditor would not merely investigate the matter, but would also have to formally report any danger situations – not just push the matter under the rug in some working-paper notation or comment about the advantages of stricter controls, tighter management, etc.

The panel listed various integrity considerations, which certainly go well beyond backup when someone sends all the disks to a laundromat or similarly destroys the material.

Security, accuracy controls and the quality of data held in the data base are all in the auditor's mind when the utmost scrutiny is necessary.

When data is recorded only once, this recording has to then be used for all subsequent use and the validation of the "initial step," i.e., the original entry, will have to be checked by the auditor as being as extensive as possible, the auditors pointed out. And that is going to cost more money, you can be sure.



The cover of NBS Special Publication 451 illustrates the new role of the data base auditor as investigator.

Similarly, the auditors called for the auditors to see that the data base has self-diagnosing capabilities to find inaccurate data. They want such a system to always include provisions for the system to internally evaluate and test its own accuracy.

Now, that is not present – nor does it need to be – in nondata base systems.

Read It Yourself

Read the report for yourself – and think about what it really means and what new aspects have added to current safeguards when a system goes data base.

After reading it, think about what it really means to prepare for the new environment. How many programmers or analysts know how to design input suitable for automatic self-diagnosis?

How many installations have sufficient control over new applications to ensure data that was originally accurate enough for all contemplated uses is not later used for a purpose for which it isn't properly edited?

That's a whole new operational standard for DP to live up to.

If half of this report is correct, we will have to review any ideas that we have on the true costs of conversion to data bases.

It is not like converting to multiprogramming or operating systems was because there the individual programs remained logically independent and any problems were effectively isolated. No longer is that true.

So now it is up to us to get ready for real data base life, not just the experimental efforts that appear to be data bases.

©Copyright 1976 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for non-commercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of *Computerworld*.

Call (800) 227-1102* for the lowest prices and fastest deliveries on new and used terminals.

*In California call (415) 632-2856

New terminals at big savings.
The lowest prices on high quality terminals going. For sale, lease or rent. TI 745 porteble terminal, plus TI 735, 725, 743 KSR, 733 KSR and ASR as well. DECwriter II printer. ADDS 580 and 980 CRT's. Diablo 1620. And others.

Year-end sale on used terminals.†
These terminals have come off lease. They're in excellent shape, were regulerly serviced, and heve a 30-dey parts/labor warranty.

†Yeer-end sele ends December 31, 1976.

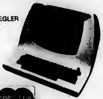
	Purchase	Monthly Rental
Detepoint 2200-126 (16K)	$5,995.00	$325.00
Datapoint 2200-400 Com Box	550.00	32.00
TI 725 Terminal	895.00	79.95
Diablo Hytype I	1,750.00	115.00
Techtran 4100 Datecassette	600.00	49.95
Beehive IIIAE	999.00	99.00

Call from 8AM to 8PM EST.

DIABLO 1620
$2,850

DECWRITER II
$1,550

TI 743 KSR
$1,195
TI 733 KSR
$1,490
TI 745
$1,875



LEAR SIEGLER
ADM-3
$975

NTC National Terminal Corporation
Oakland Airport Office Center
303 Hegenberger Road, Suite 203
P.O. Box 6579
Oekland, CA 94621, (415) 632-2856

BANKAMERICARD master charge

Letters to the Editor

Honeywell Not Selling At Garage Sale Prices

Herb Grosch, in "DP Fairy Tale Has Three Dwarfs Left" [CW, Nov. 1], stated "Honeywell is having a garage sale." If this is true, Honeywell is certainly not selling its equipment or services at garage sale prices.

Now, I am no great lover of Honeywell management, but I do believe it has put out and is still putting out some very good and reliable equipment. I am very satisfied with the Honeywell equipment we have and am quite proud of the things we are doing with it.

In a previous column, "Into the Act" [CW, Mar. 1, 1976], Grosch said things were looking pretty good at Honeywell with the advent of Level 6. Now he completely reversed this position without explanation, which leads me to ask: Will the real fairy tale please stand up?

Michael P. Eiseman
Vice-President
Revere Electric Supply Co.
Chicago, Ill.

Mysterious Results in '89

David Schechter's five-digit number (FDN) technique [CW, Nov. 8], which we call day of century (DOC), eliminates end-of-decade problems such as the January 1970 disasters and reduces the end-of-century problems – January 2000 will be a good month to vacation in Antarctica.

However, using two bytes to store day-of-century dates in the IBM 370, as Schechter suggested, will produce some mysterious results around 1989.

IBM 370 binary arithmetic operations treat the high-order bit of 2-byte data as the sign of the number (0 for positive, 1 for negative). Only 15 bits are used for the magnitude of the number, giving a maximum of 32767.

It appears Schechter's will have negative dates after Sept. 17, 1989 (32767).

A full word (four bytes) on the IBM 370 permits a maximum number over two billion. Using a full word, you can set your base date to the first day of our calendar (the birth of Christ, if you will), and your date processing routines should remain valid for a long time.

Joseph W. Begasse
Consolidated Edison Co.
of New York, Inc.
New York, N.Y.

Say It Ain't So

The Social Security Administration said a new tape mounting and control system will save about $1 million per year [CW, Oct. 18]. As I interpret the figures, it looks more like $600,000.

The estimate was based on a study of the old system from June 1 to July 15 and on the new system from July 16 to Aug. 31. Both studies covered three daily shifts, Monday through Friday.

My problem is that there is no explanation of the holiday on Monday, July 5, during the old system study.

If no other day was used, the old system covered 32 days and the increase was 12.7 jobs per day, or about 66% of their figure.

Please tell me they're OK, I'm not OK, and make me a happy taxpayer.

Stephen D. Barry
Winchester, Mass.

OVER 700 DP Managers now use the JOHNSON JOB ACCOUNTING REPORT SYSTEM

Send for FREE 30 Page System Characteristics Manual

■ Accurate Job Accounting ■ Continuous Performance Measurement ■ Equitable Cost Distribution ■ Optimized Software Performance ■ Accurate Customer Billing ■ Realistic Thruput Analysis ■ Optimum Resource Utilization

supports:
MFT-MVT-VS1-VS2-HASP-DOS-DOS/VS-POWER/VS

JOHNSON SYSTEMS INC.
8400 Westpark Orive, McLeen, Virginia 22101

NAME ____
TITLE ____
COMPANY ____
ADDRESS ____
CITY ____ STATE ____
ZIP ____ PHONE ____
COMPUTER ____ OPERATING SYSTEM ____

JASPER JOB ACCOUNTING SYSTEM

JOB ACCOUNTING
POWER VS ACCOUNTING
RJE ACCOUNTING
COMPUTER PERFORMANCE ANALYSIS
USER BILLING
COST DISTRIBUTION
BUDGET CONTROL
THRUPUT ANALYSIS
PAGING ACTIVITY ANALYSIS
PERIPHERAL UTILIZATION
PROGRAMMER ACTIVITY ACCOUNTING
JOB SCHEDULING INFORMATION

DATACHRON

☐ HAVE YOUR REPRESENTATIVE CALL
☐ SEND INFORMATION ☐ JASPER

DATACHRON CORP.
174 FIFTH AVE. NEW YORK N.Y. 10010

name ____ title ____
company ____ tel. ____
address ____ city ____
state ____ zip ____ cpu model ____

COMPUTERWORLD

. . .the one weekly newspaper that's designed to fulfill your unique "need to know". . . the one newspaper that can give you all the current information you need to benefit you, your organization and your career progress. . . 52 weeks of incisive news, commentary and special reports. . .subscribe today, use the attached postage paid order form.

☐ *Please enter my subscription*
(details on back)

☐ *I'm already a subscriber, but I'd like you to change my:*
  - ☐ *address*
  - ☐ *title*
  - ☐ *industry*
  - ☐ *other*

My current mailing label is attached and I've filled in new information on the other side

Put old label or label information here.

P COMPUTERWORLD RATES: U.S. - $15 Canada and PUAS - $23 Other foreign - $40

If charge we must have cardholder's signature:

Signature ______________________

Expiration Date ______________________

First Initial ___ **Middle Initial** ___ **Surname** ______________________

Your Title ______________________

Company Name ______________________

Mail To: ______________________

City ______________________ **State** ___ **Zip Code** ______

Address shown is:
☐ Business
☐ Home

☐ Check here if you do not wish to receive promotional mail from *Computerworld.*

COMPUTERWORLD

PLEASE CIRCLE 1 NUMBER IN EACH CATEGORY

BUSINESS INDUSTRY

- **10** Manufacturer of Computer or DP Hardware/Peripherals
- **20** Manufacturer (other)
- **30** DP Service Bureau/Software/Planning/Consulting
- **40** Public Utility/Communication Systems/Transportation
- **50** Wholesale/Retail Trade
- **60** Finance/Insurance/Real Estate
- **70** Mining/Construction/Petroleum/Refining
- **75** Business Service (except DP)
- **80** Education/Medicine/Law
- **85** Government - Federal/State/Local
- **90** Printing/Publishing/Other Communication Service
- **95** Other ______________________

TITLE OCCUPATION FUNCTION

- **11** President/Owner/Partner/General Manager
- **12** VP/Assistent VP
- **13** Treasurer/Controller/Finance Officer
- **21** Director/Manager of Operation/Planning/Administrative Service
- **22** Director/Manager/Supervisor DP
- **23** Systems Manager/Systems Analyst
- **31** Manager/Supervisor Programming
- **32** Programmer/Methods Analyst
- **41** Application Engineer
- **42** Other Engineering
- **51** Mfg Sales Representative
- **52** Other Sales/Marketing
- **60** Consultant
- **70** Lawyer/Accountant
- **80** Librarian/Educator/Student
- **90** Other ______________________

Detach here, fold, and place in post-paid envelope attached through binding.

SOFTWARE&SERVICES

CPEUG Keynoter Says

Microprocessor Revolution Changing Focus of CPE

By Don Leavitt
Of the CW Staff

SAN DIEGO – The problem faced by computer performance evaluation (CPE) is not being changed by the microprocessor revolution, but the point at which the problem is attacked is changing, according to Seymour Jeffery of the National Bureau of Standards.

Keynoting this year's meeting of the CPE Users Group (CPEUG) here recently, Jeffrey said CPE, "properly understood and applied," has always been concerned with finding better and more economical ways for users to satisfy their DP needs."

And the only way to do that, he added, is to understand the technology and to understand the application well enough to find a cost-effective fit between the available equipment and the need.

In the past and even today in working with general-purpose mainframes, "CPE has had to second-guess systems programmers, operators and applications programmers. In the future," he continued, with micro-based systems "we will probably find it more useful to second-guess the systems analyst and the systems designer."

Economics Doubtful

The economics of computing with microprocessors has begun to raise "considerable doubts" about the cost-effectiveness of end-user CPE studies "and these doubts are more likely to increase than to go away" as micros become more prevalent, Jeffery told the group.

Traditional CPE developed as it did because the physical size and environmental requirements of computer systems made it natural to bring the workload to the system, he noted. In turn, centralized CPU sites maximized both the ability to make changes and the potential for large payoffs in increased efficiency, he said.

"But what happens to this way of thinking," he asked, "when the 'natural' dynamics no longer apply – when, through lower costs and vastly reduced size, the computer goes to where the workload is, instead of the other way around?"

The implication of such a trend on CPE technology is "devastating," Jeffery said. The dispersion of computer power across a user community "would raise the cost of conventional measurements well beyond acceptable levels," he added.

Performance measurement and tuning came into prominence only after operating systems became "an art form" in the mid-1960s and end users "finally became convinced technology had truly left them in its tracks," Jeffery said in recalling the history of CPE.

Computers had always been fast, but early users saw them doing one recognizable workload step at a time. Multiprogramming operating systems changed all that by doing parts of several different tasks concurrently "in order to increase the utilization of an expensive CPU," he recalled.

The operating system itself grew and developed "an ever-increasing need for hardware resources" and, in time, CPE emerged as an attempt to unravel the multiprogramming mystery and impose "some measure of control" over a wasteful resource, he continued.

But now, with micros, operating systems may become completely unnecessary, Jeffery believes. "In contrast to the complexity of multiprogramming systems, microprocessors are models of regularity and simplicity," he said.

"Where multiprogramming baffled users, micros intrigue them: in place of the alienation that came from excluding users from the computer room, micros offer availability, convenience and familiarity," he added.

Without complex operating systems, the end user's need to measure hardware or software performance "virtually disappears." The need to build a good system, however, takes on added importance in micro-based systems that aren't expected to be tuned once they are in place, Jeffery said.

Good Design Seen Key to On-Line System

By Don Leavitt
Of the CW Staff

CINCINNATI – To get the most out of an on-line system, users have to design for performance and then measure the attained performance and make useful adjustments, according to a systems engineer for Cincom Systems, Inc.

Leading a technical session at the recent Knock-About, or Cincom users group meeting, Jon Waters said the design phase should be based on proven, efficient techniques.

But more important, he added, is the setting of goals for performance – the defining of exactly what is to be accomplished.

If those goals are in place, the performance measurement phase is straightforward. "Does the system match the goals? If not, where is the bottleneck?" he asked.

In any case, he added, "What is the expansion potential?"

Consideration Questions

Actually, Waters noted, the design phase has to take two things into consideration: What really must be done and how should it be done with the greatest economy of resources.

Here again, a series of questions illustrates the concerns the designer must have, he said.

Once the design is set, is it really what the end result should be? Beyond that, what are the future plans? he asked.

In terms of resources, what is the best way to do this? Will our methodology let us grow? And what is the most reliable and supportable method for meeting our goals?

In some plans, there are functions that would be better handled in batch processing; in others, functions laid out for single-thread handling might be done as a paralleled, overlapped task, Waters said.

Designers must determine if all the required functions fit into the time frame that is predicted, plus a pad factor, for good response and throughput.

A full analysis must be done, with inputs from all personnel – programmers, terminal operators, user management and DP management – in order to define the system, Waters emphasized.

Defining the performance goals is another two-step process, the systems engineer continued. The designer has to determine the nature of the required throughput and set goals appropriate to the application.

The goals are best defined in "units of work" terms. Then, by breaking down the units of work into components, a throughput potential or response time prediction can be made, he said.

Result of Design Efforts

Recognizing his presentation was heavily dependent on a lot of questions, Waters pointed out the net result of design efforts in which too few questions are asked might be a "wonderful system that has features no one ever uses" or "an immense amount of overhead for no reason."

Once concern for design has shaped a system that will do the right job, the concern must switch to doing the job right, he went on.

The designer has to make a wise choice of file types so as to minimize I/O accesses and data transmission requirements, he said.

Designers must recognize hardware layout is "critical" to performance, he said. The teleprocessing network must be balanced for even activity distribution, and this means using as many disk channels and devices as possible.

Users should try to keep master files on different disks, rather than on related variable files, to minimize seek times.

When sharing disks, related files should be located near each other, he added.

$295 Sort Handles Small Files

ANAHEIM, Calif. – A low-cost sort package from an independent software vendor here is said to gain its efficiency by being limited in its use to working with only small- and medium-sized sort assignments.

Files larger than 500,000 bytes just aren't handled well by the package, according to Bill Page, DP director for the Page Co.

Sorting is traditionally one of the major operations in a DP installation and Page got into its own development when packages available to it didn't seem to do the work as well as Page wanted, he indicated.

The problem appeared to be that all the packages were so generalized to work with all kinds of files and a variety of sorting demands that they weren't particularly good on any particular type of file, he explained.

At the end of its programming effort, Page had what appeared to be an "extremely efficient" in-core sort for small and medium amounts of data, he said.

At this point, Page claimed he thought he had failed, but he gave copies of the sort to a few users who had helped in the development effort.

Positive Reactions.

The reactions were far more positive than he had anticipated, Page said.

Then he realized his own situation wasn't very different from others'. In his installation, as much as 75% of the CPU time utilized by sorting was devoted to precisely the small- and medium-sized jobs for which his coding had been tailored, he said.

"The only solution we could come up with," he added, "was to offer the program at a very low price [$295] and offer a free trial at the user's installation," Page said.

The program itself requires 3K plus whatever room for buffers the user can spare. It works any IBM OS or OS/VS environment, he added.

The company can be reached through P.O. Box 6372, Anaheim, Calif. 92806.

DATA CENTER RESOURCES MANAGEMENT...JOB SCHEDULING...
PRODUCTION CONTROL...

TO PERFORM THESE FUNCTIONS YOU NEED INFORMATION. INFORMATION FROM A NUMBER OF SOURCES, LIKE . . ..

SOME OF YOUR INFORMATION NEEDS	THE SOURCES
The source of the work to be processed	Manual Files
The time in - time out of each job	Manual Files/Operating System
The dependence of one job to another	?
The people available	Data Center Staffing
The work stations that are available	Manual Files
The priority of each job	Operating System
The job mix to be processed	?
CPU & Peripherals requirements	?
Information about past requirements	?
Potential resource contention	?
Historical job run times	Manual Files/SMF Data
Alternative production schedules	?

If you have some questions about better resource management, job scheduling and production control . . . Allow us to introduce you to our scheduling system . . . You'll find the information you need.

FROM VALUE COMPUTING - THE COMPUTER OPERATIONS COMPANY

Please send more information about VCI's Scheduling System.

VALUE COMPUTING INC.
300 VCI Building/West Marlton Pike
Cherry Hill, N.J. 08002

Name
Company
Title
Phone
Address
City State Zip
CPU Operating System

IUP Extends IBM Life Insurance Program

WHITE PLAINS, N.Y. – The Statutory/Generally Accepted Accounting Procedures (GAAP) Valuation System, an Installed User Program (IUP) from IBM, supports life insurance applications running under IBM's DOS/VS and based on the Consolidated Functions Ordinary (CFO II) program product, a spokesman noted.

Developed by actuaries at Carlin-Black Systems Corp. in Louisville, Ky., the system calculates statutory and GAAP reserves, premium items, details on policy values, reserves released and policy exhibits for year-end and interim reviews, he added.

The valuation portion of the package covers life insurance, annuities, accident and health, supplemental benefits, "extra life" and "paid-up" categories. It accepts the CFO II policy master file directly, IBM said.

The programs extract records from the CFO policy master file, perform various sorts, develop control totals, perform the valuation calculations, print reports and create output files for later programs, the spokesman said.

The logic includes edits, "meaningful" error messages and audit trail reports with control totals, he added.

Written in ANS Cobol, the system was tested with the Cobol/VS compiler and the Sort/VS under DOS/VS Release 32. The programs require three magnetic tape drives, a 3330 disk unit, a printer and a card reader; modifications can be made to eliminate the need for the tape drives or to support other disk systems, IBM said.

The largest program, not including sort, is approximately 90K bytes.

As an IUP, the system will be provided with error-correction services only until Oct. 31. Within that time frame, the support is limited to providing a list of errors and proposed solutions.

The system costs $1,040/mo but payment is waived after the first 12 months of continuous use, IBM said.

CAC 'Texed' Creates Documentation

CINCINNATI – Texed from Computer Assurance Corp. (CAC) is described as a program that produces "publishable" documentation, letters and standard operating procedures from free-form punched-card input.

In addition to printing whatever text is provided according to user-provided format instructions, the program also provides a table of contents and an alphabetic index with page number references for longer pieces of documentation, the company said.

Input cards are free-form except for three columns on each which are set aside for printer format control. All extraneous spaces are suppressed so that, for example, sentences can be punched on individual cards and sequenced as desired just before the actual print run, CAC said.

Written in ANS Cobol, Texed runs in a 20K partition under IBM's DOS or DOS/VS and requires only a card reader and a line printer as peripherals.

Source code for the program is available for $350. Buyers are also provided a test deck – which produces a user manual – and a hard-copy user manual, a spokesman said from Department C-D, CAC, 8041 Hosbrook Road, Cincinnati, Ohio 45236.

Symposium on Operating Systems Seeks Papers for 1977 Conference

WEST LAFAYETTE, Ind. – The Sixth Symposium on Operating Systems Principles (SOSP-6) will be held a year from now, on Nov. 16-18, 1977, at Purdue University here.

Papers emphasizing concepts or principles of general application in operating systems are invited, according to SOSP-6's paper coordinator, Dorothy E. Denning.

The meeting is sponsored by the Association for Computing Machinery (ACM) Special Interest Group on Operating Systems. It will be hosted by the Computer Sciences Department and arranged by the Division of Conferences and Continuing Education at Purdue.

In the call for papers, Denning said March 31 is the deadline for six copies of each article to be considered. All should be typed (double-spaced) and none should be more than 20 pages long.

The papers will be reviewed "blind" by the program committee, so the author's name and affiliation should appear on the cover page only, she added.

Notices of acceptance or rejection will be sent out by May 15; papers of special merit will be included in a special issue of the *Communications of the ACM* in early 1978.

Papers for the conference should be sent to Denning, SOSP-6 Paper Coordinator, Computer Sciences Department, Purdue University, W. Lafayette, Ind. 47907.

Directory from Atsu Details T/S Services

BOULDER, Colo. – The Association of Time-Sharing Users (Atsu) has published the first three sections of a comprehensive directory for users of commercial time-sharing and remote computing.

Called the "Interactive Computing Directories," they complement the association's bimonthly newsletter, "Interactive Computing," according to Hillel Segal, president of Atsu.

Section Coverage

The first section covers financial modeling languages offered by the time-sharing companies, with data covering 60 languages.

The second section covers interactive data base systems while the third, called "Company Profiles and Security Precautions," offers information about 40 companies offering remote computing services.

The cost of membership in Atsu, including the newsletters and directories, is $60. Atsu is at 75 Manhattan Drive, Boulder, Colo. 80303.

Service Aids Investments

TORONTO – A service to help money managers see how a portfolio will perform under various conditions is available from Canavest House Ltd.

The user must provide the raw data based on what he thinks is likely to happen to such variables as interest rates, wage settlements and commodities prices, Canavest said.

Once the user determines the likely return, holdings can be changed appropriately, a spokesman explained.

By-products of the service are hard-copy reports the user can show his clients to explain why certain investments were made.

Users need only English to access the service's two IBM 360/75s by dial-up phone lines.

The service costs $13,000 to $30,000 annually. Canavest can be reached through P.O. Box 13, Commerce Court Postal Station, Toronto, Canada M5L 1A3.

LOCATE and EVALUATE
MINICOMPUTER SOFTWARE

- Over 300 completely detailed program descriptions.
- Operational requirements
- Indexed by Application
- Cross referenced by:
  Minicomputer CPU (S)
  Source Lenguage

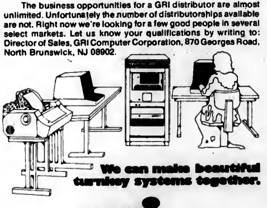
Subscription Includes: Bese Volume plus 4 Updetes
$75. U.S./Canada - $100. Foreign
INTERNATIONAL MANAGEMENT SERVICES, INC.
70 Boston Post Road, Dept. C · Weylend, Mess. 01778

A GRI distributor:
The key in turnkey systems.

If you are experienced in the applications-programming end of the computer field and have a good working knowledge of RPG II, you have a very saleable talent. All you need to turn that talent into a successful turnkey operation is a very saleable small business system. And we have it. The GRI System 99.

System 99 is a minicomputer-based multi-user business system supporting Interactive RPG II. It comes with a GRI 99/50 computer, disk, printer, and video terminal(s). It also comes fully software loaded and ready to program. And it's very competitively priced. With no trouble whatsoever, we can also configure the System 99 with other peripherals—including 80- and 96-column card equipment and magnetic tape—for both on-line interactive data entry *and* batch processing.

The business opportunities for a GRI distributor are almost unlimited. Unfortunately the number of distributorships available are not. Right now we're looking for a few good people in several select markets. Let us know your qualifications by writing to: Director of Sales, GRI Computer Corporation, 870 Georges Road, North Brunswick, NJ 08902.



We can make beautiful turnkey systems together.

gri
GRI Computer CORPORATION

MACHINE SHIP DATE

370/138 1 meg- Dec,1976

340/148 2 meg- April,1977

Configured To Your Specs
SPECIAL
360/50 H-I 2 or 3 CH 1052-7
GREAT RATES NOW

NATIONAL COMPUTER RENTAL, LTD.
415 Madison Ave.
New York, N.Y. 10017
Call Collect: (212) 532-1500

Member of Tiger Leasing Group
Member of Computer Lessors Assoc.

RSTS/E USERS – DO YOU SCHEDULE YOUR PROGRAMMERS TO PRODUCE
A PROGRAM PER DAY?
M.P.G. * USERS DO!

and they get in a high level, truly functional commercial programming language

- Optimised object code for execution efficiency
- Fully interactive file updating, reporting and enquiry with complete security
- Integrated Sort package which optimises available core devices in just one line of code
- On line data entry with interactive validation to Data Base
- Easy to read and maintain, fully documented "English" source programs.
- Immediate mode on-line program development capabilities

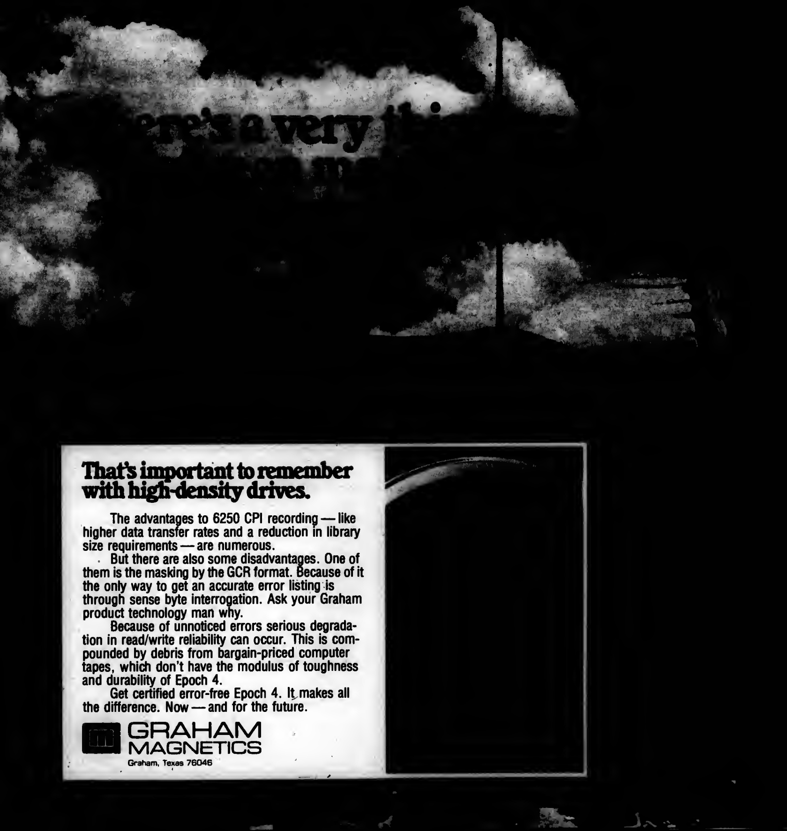
Let MPG reduce your system development costs and lead-time whilst you concentrate on putting your computer to work more efficiently

* MPG stands for "MIS PROGRAM GENERATOR"

We are currently in the U.S.A. installing M.P.G.
For a free introduction to M.P.G. write to:

C.W. Box 4862 797 Washington Street
Newton, Mass. 02160
or the address below

MANAGEMENT INFORMATION SYSTEMS PTY. LTD.
3 Bowen Crescent, Melbourne, Victoria. 3004. Australia.



That's important to remember with high-density drives.

The advantages to 6250 CPI recording — like higher data transfer rates and a reduction in library size requirements — are numerous.

But there are also some disadvantages. One of them is the masking by the GCR format. Because of it the only way to get an accurate error listing is through sense byte interrogation. Ask your Graham product technology man why.

Because of unnoticed errors serious degradation in read/write reliability can occur. This is compounded by debris from bargain-priced computer tapes, which don't have the modulus of toughness and durability of Epoch 4.

Get certified error-free Epoch 4. It makes all the difference. Now — and for the future.

GRAHAM
MAGNETICS
Graham, Texas 76046

Survey Finds Users Favor Unrestricted DP for Carriers

By John P. Hebert
Of the CW Staff

RAMSEY, N.J. – Telecommunications users favor minimum regulatory restrictions on the use of computers as an integral part of terminal services provided by common carriers, a recent survey has found.

The Center for Communications Management, Inc. (CCMI), an independent telecommunications research organization here, conducted a survey providing readers of its industry publication, *This Month in Telecommunications*, a chance to voice their opinions on "the role of the DP functions within the data terminals service offerings of the communications common carriers."

Tired of Overregulation

A CCMI spokesman said ballots indicated users are tired of overregulation of the DP and data communications functions in all areas and types of business and believe the dividing line between the functions should be decided by open competition.

Preliminary results of the survey showed 56% of the 200 telecommunications users, consultants, vendors and carriers surveyed selected definitions offered by CCMI which would not restrict the carriers' use of computers at the terminal level, CCMI reported.

The results were summarized and distributed to all Federal Communications Commission (FCC) commissioners, the Office of the President and members of congressional committees active in telecommunications legislation, CCMI said.

Copies of the findings sent to the FCC were entered into the record of the second Computer Inquiry as users' views on current definitions of the boundary between data communications and DP, the CCMI spokesman noted.

Second Inquiry

A second inquiry was initiated, the FCC said, because distributed networks in which CPUs and terminals are performing both DP and communications control applications have been among the developments since the first inquiry in 1971 [CW, Aug. 9].

Readers of the CCMI publication were asked to choose one of six alternative definitions of the role of DP as it applies to carriers' terminal offerings. CCMI ranked the six definitions as restrictive to the common carriers' use of computers, permissive or noncommittal, the spokesman explained.

No attempt was made to categorize a seventh choice, which offered the respondent his own opinion, although some of those responses were sent to the FCC along with the survey's results, he added.

A total of 37% of respondents agreed there should be no restrictions placed upon the carriers' authority to provide integrated DP functions with their data terminal equipment; about 21% said if a user's primary application of a terminal's DP capabilities is limited to word processing of the communications functions, it should not be classified as a DP system.

User Majority

CCMI noted 62% of respondents were users, 10% were consultants, 10% were common carriers and 7% were equipment suppliers.

Respondents were also asked to categorize the size of their firm or organization using gross sales as a yardstick; 45% of the returned questionnaires were from firms with sales over $100 million and 19% were from respondents in organizations with annual sales between $10 million and $100 million.

About 20% of all those who returned the survey favored a permissive stance for common carriers' use of computers at the terminal level, CCMI said.

The responses were "probably the opinions of more outspoken people because it was not easy to get the responses back" to CCMI; the publication's readers had to take the initiative to return the questionnaires, the spokesman said.

CCMI can be reached through P.O. Box 324, Ramsey, N.J. 07446.

Fujitsu Net Architecture Based on HDLC

By Ronald A. Frank
Of the CW Staff

CHICAGO – Fujitsu Ltd. has developed a data communications architecture which is operational on several Japanese data networks utilizing the firm's Facom CPUs, according to Shigeo Shiratori of the Fujitsu data communications architecture staff.

Called the New Network Architecture (NNA), or Realized Network Architecture, the technique includes a data link protocol based on the Higher Level Data Link Control (HDLC) developed by European standards groups, Shiratori told a session on international data networks at the recent Info '76 conference here.

An advanced network architecture had to be developed for Japanese data users because of the high cost of carrier facilities; a voice-grade line costs about $3,000/mo over a 500-mile link for operation at 2,400- or 4,800 bit/sec, Shiratori said.

NNA is based on a separation of on-line system functions into DP and data communications control. It also includes a classification of data communications control functions and the use of HDLC, he explained.

HDLC is more reliable than conventional basic mode link control procedures because it has sequential number and check bytes against error in each transmission block and corresponding response, Shiratori said. Although the Fujitsu architecture is similar to IBM's Systems Network Architecture (SNA), it was developed before SNA and is different in implementation, he added.

In designing the architecture, the separation of DP and data on-line system functions also helped clarify the respective roles of control programs and applications programs. As a result, the role of control programs was redefined and the support level was improved, he said.

Three hierarchical levels were incorporated into the architecture, according to Shiratori. These are data link control, network control and path control levels.

In addition, a protocol was developed for remote job entry and file transfer called the application control level, he noted.

The link level controls a data link between physically connected nodes to prevent errors occurring on communications lines. Various types of nodes exist: center systems, subcenter systems, terminals, etc.

The network level controls a session between a source node and a destination node to transfer data correctly. The path level controls a session between a process in one end node and a process in another to connect and disconnect them. The path level also controls data flow between the nodes, Shiratori explained.

Path-level control may be done when net-level control is in operation and net-level control may be done when link-level control is operating. In each station, three control modules correspond to the control levels, but each level of protocol is independent of the other, enhancing flexibility since one can be changed without affecting the others, Shiratori said.

One network operating with the Fujitsu architecture includes a Facom 230 Model 58 which "has nearly equal perform-

(Continued on Page 21)

'Dicam' Lets Datasystem 350 Communicate With IBM 360/370

MAYNARD, Mass. – Digital Equipment Corp. has introduced software which allows the company's Datasystem 350 series of small business systems to interactively communicate with IBM 360/370 mainframes.

Written in Digital's Business-Oriented Language (Dibol), the Dicam software permits 9,600 bit/sec transmission in IBM's Bisynchronous protocol over dial-up or other phone lines, according to a DEC spokesman.

This allows a decentralized approach to DP operations, he added.

Dicam permits the local storage resources of a Datasystem to complement the data base and processing resources of the host IBM system while remaining an independent processor, he said.

Datasystems operating with Dicam include CRT terminals, printers and mass storage devices ranging from 512K bytes on floppy disks to 112M bytes on removable disk cartridges, he said.

Major application areas for the distributed processing arrangement include sales order entry, inventory control, billing, consumer information and relations, payroll and waybill generation, according to the firm.

The Dicam software, which runs under DEC's CTS-300 operating system, has a licensing fee starting at $4,500; it will be available in January, the spokesman noted from DEC's Commercial Products Group in Maynard, Mass. 01754.

terminals

digital
☐ LA-36 DECwriter II
$1650 $59/mo*

LEAR SIEGLER
☐ ADM-1 $1550 $56/mo*
☐ ADM-2 $2495 $90/mo*
☐ ADM-3 $ 995 $36/mo*

TEXAS INSTRUMENTS
☐ 733 KSR $1550 $56/mo*
☐ 743 $1350 $49/mo*
☐ 745 $1950 $70/mo*

Diablo
☐ Hyterm $2990 $108/mo*
☐ 933 $2850 $103/mo*

TELETYPE
☐ 33 KSR $ 895 $32/mo*
☐ 33 ASR $1278 $46/mo*
☐ TWX/DDD $1749 $63/mo*

*3 year lease with purchase option

Terminal accessories
☐ Acoustic couplers ☐ Digital cassette recorders ☐ Modems ☐ Supplies
Check items of interest and return to us for more information

ComData
8115 Monticello Skokie Il. 60076
Tel. (312) 677-3900 TWX 910-223-3617 [illegible]

name
company
street
city state zip
telephone ext.

Upgrades Controller, Adds Scanner

IBM Brings Out 3660 Enhancements

WHITE PLAINS, N.Y. – IBM has upgraded the controller portions of both its 3660 supermarket key-entry and scanning point-of-sale (POS) systems while adding another, smaller scanner to the 3660 scanning system.

IBM's 3663 Model 3 terminal control segments – logic and memory boxes which work in conjunction with the key-entry supermarket terminals – can support three checkout keystations; its Model 2 predecessor had the capability to support only two stations, an IBM spokesman explained.

With the 3663 Model 3, the maximum number of checkout lanes for the system is increased from 12 to 18, which also translates into savings in some medium-sized installations, he said.

For example, supermarkets installing the key-entry system with the upgraded controller segment for nine checkout lanes can purchase a typical system for about $47,600 compared with about $59,500 for the same configuration with a 3663 Model 2. The spokesman said the cost saving results from a greater sharing of computational capabilities.

The Model 3 control segment performs the same functions a key-entry system in-store controller performs if the system controller fails, he added.

Certain in-terminal devices such as keypad locks are now optional features, although two previously extra-charge optional keyboards are now available as no-charge options, IBM said.

First shipments of the 3663 Model 3 control segment are scheduled for this quarter.

Model 2 Controller

The corporation also brought out the 3661 Model 2 in-store controller for the 3660 key-entry system. The Model 2 features up to 560K characters of information storage, double the storage capacity of the Model 1 controller, IBM said.

The 3661 Model 2 stores data for price lookup, in-store reports and sales for the entire system. It will be available in the third quarter of 1977 and carry a purchase price of $14,620.

Along with the key-entry system introductions, IBM also announced another version of its supermarket POS system scanner.

The IBM 3667 scanner is contained in a 28-in.-high enclosure; the previous Model 3666 scanner is 38 in. high.

With the 3667, a store with 10 checkout lanes can purchase a basic system, including an in-store controller, terminals, scanners and adapters, for about $133,100 compared with the previous cost of $154,100. IBM noted the savings primarily result from the lower cost of the 3667 and from lower cost adapters.

Additionally, IBM reduced the purchase price of its current 3666 scanning unit from $4,240 to $3,560, which is the price of the 3667 scanner, according to the spokesman. The reduction was possible because of cost savings in IBM's engineering and manufacturing of the scanners, he said.

Label Preparation Device

Another feature introduced for the 3660 systems is a shelf-label preparation device enabling supermarkets to print price labels in the store.

With this device, pricing and merchandise information can be developed by a supermarket chain's headquarters and transmitted to an in-store control unit. There, IBM said, labels can be printed two at a time, side by side on a supermarket system POS terminal.

The label preparation feature for both systems is field-installable and will be available in April at a cost of $600 or on IBM's Alternate Term Plan for $23/mo.

Converter Debuts

WORCESTER, Mass. – What is billed as the only 8-bit digital-to-analog converter in a dual in-line package that includes a storage register has been announced by Micro Networks Corp. (MN).

The MN3020 converter can be used directly with microcomputer or minicomputer data buses because of its input registers, according to an MN spokesman.

The unit includes an internal reference and output amplifier as well as the storage register; the input circuitry is said to be TTL-compatible.

When the converter-enable input is high, input data is held and the analog output will not change with further changes in the digital input.

The MN3020 is priced at $39. A military version, the MN3020H, costs $69 from MN at 324 Clark St., Worcester, Mass. 01606.

Fujitsu Using HDLC As Architecture Base

(Continued from Page 20)

ance to the IBM 370/158," Shiratori said. The Model 58 serves at the center node and communicates with subcenter nodes that have a Facom 230 Model 35 and a Model 28.

Transmission between these centers at 48 kbit/sec utilizes NNA. Data entry and inquiry into the network are done on Facom 9520 CRT terminals and Facom 1520 teleprinters, he said.

The network simultaneously handles message collection, distribution and remote batch applications with the high-speed lines sharing the traffic.

Another distributed network for a manufacturer uses HDLC on all its links and utilizes several minicomputers as intelligent terminals, a node CPU and a process computer, Shiratori said.

HDLC More Effective

A study of network implementations using NNA showed the HDLC-based operation was 1.1 to 1.3 times more effective than basic mode on point-to-point applications, he said.

Full-duplex transmission is common on these types of configurations, so this transmission mode was assumed for the comparison, he pointed out.

In a multipoint evaluation comparing half-duplex basic mode with full-duplex HDLC mode, NNA was 2.1 to 2.3 times more efficient, he said.

the day our dream came true.

Electronic Memories and Magnetics went into business with the dream of becoming the top add-on memory house in the business It took over fifteen years of experience to plan for and realize that dream Through good times and bad Through many dramatic changes in the computer business

Our new position of strength.
We reached our new position the day we took over the Cambridge Memories 360/370 add-on memory lease base. EMM achieved this position by more than doubling its add-on memory installations worldwide More users and computer manufacturers are now using EMM memory products than those of any other independent add-on memory firm.

Vertical integration a step at a time,
This most recent addition is but another step in our carefully planned program of vertical integration. It has enabled EMM to better satisfy most add-on memory requirements from basic semiconductors to large capacity units.

The all around add-on memory package.
Our present leadership position is no fluke. It is the result of our experience and our responsiveness to your changing needs for add-on memory availability This experience enables us to manufacture products of exceptionally high reliability, offer complete compatibility with all major 360/370 products, provide pricing for *your* needs as well as ours, present imaginative lease or purchase financing plans, and make available round the clock/round the year worldwide service for an impressive list of quality customers

A statement of commitment.
EMM's commitment to the add-on memory market is more than talk It's the way of thinking and doing business that got us to the top It was born in a dream Tempered by the crushing demands of the marketplace And motivated by the pride and the profit that results from serving you best of all In fact, it has grown stronger with our progress Beginning now, we will periodically issue "statements of commitment" to keep you informed of new developments regarding our activities on your behalf

It's tough at the top.
Electronic Memories and Magnetics is now tops in add-on memories for very sound reasons Not the least of which is the most complete add-on memory package in the business We know it won't be easy to maintain this position It will require continued close attention to your needs and a broadening of our commitment to excellence But way back at the beginning of our dream, no one ever told us being tops would be easy

Find out how our dream can fit into your requirements Call your regional EMM sales office Eastern (201) 845-0450 Central (312) 297-3110 Western (213) 477-3911 Europe: Bad Homburg, West Germany 06172/6094

EMM SYSTEMS EQUIPMENT DIVISION
Electronic Memories & Magnetics Corporation
3216 West El Segundo Boulevard, Hawthorne, CA 90250
All the add-on memory you need.

Qantex Adds Interface Adapter

PLAINVIEW, N.Y. – Qantex has a dual interface adapter, the DIA-100, designed for use with its models 2200, 2400 and 2710 cartridge storage systems.

The DIA-100 permits a storage system to become a two-port device; one of the systems' two ports can be interfaced to similar or different controllers, Qantex said.

Utilization of the DIA-100 is said to allow two or more redundant CPUs to share a common data base by communicating with the Qantex cartridge storage peripheral.

CPUs accommodated by the system include the Digital Equipment Corp. PDP-11, Intel Corp. 8080 and Rolm computers.

The adapter consists of a single printed circuit card that plugs directly into the storage system.

The DIA-100 costs $695 from Qantex at 200 Terminal Drive, Plainview, N.Y. 11803.

CMC 1800 Gets Remote Keystations

MARINA DEL REY, Calif. – The CMC Division of Pertec Computer Corp. has added remote keystation capability for the CMC 1800 Keyprocessing System.

The video display keystation is offered in two models, the CMC 1155 and 1156, each with detachable keyboards, according to a Pertec spokesman.

The 1155 features a keypunch-style keyboard while the 1156 has a typewriter-style keyboard with numeric pad, he said, adding both models utilize standard CMC software.

The remote data entry capability reportedly allows keystation operators at remote sites to enter, verify, correct and update data through dial-up phone lines under the control of a central supervisor.

A built-in remote keystation adapter/modem at the remote site and a remote keystation controller at the central site enable the 1800 system to control the remote keystations, the spokesman said.

Data transmission to and from the keystations is asynchronous and full-duplex on two- or four-wire systems, he noted.

Each remote keying terminal can interface a second keystation terminal – for a total of two – directly to the communications line by means of a Bell-supplied Data Access Arrangement (DAA), he added.

The CRT units for both models can display eight 32-character lines and a 240-character data record plus 16 characters of mode and status information.

The keystations operate at two speeds: at 150 bit/sec to the CPU and at 2,400 bit/sec from the CPU to the keystation to update or change data appearing on the CRT.

A 480-character buffer comes with either model as standard equipment, although only 256 characters are ordinarily used, a spokeswoman added.

Both keystations cost $8,400 each or $4,900 each in groups of eight; they lease for $210/mo or $122.50/mo respectively, she added.

The CMC Division of Pertec is located at 2500 Walnut Ave., Marina del Rey, Calif. 90291.

Trivex Launches Fault Isolation For Plus 70 CRT

ORANGE, Calif. – Fault isolation routines which reportedly spot the cause of display system failures have been added to Trivex, Inc. Plus 70 IBM 3270-compatible systems at no additional cost.

With the isolation routines, according to Trivex, the terminal controller lets the user determine whether the terminal system, communications controller, modem or phone line is the cause of malfunction.

The user can trace the source of the problem to the host computer, at the far end, or down to the board level of the terminal, a spokesman added.

Microprocessors that drive the Plus 70 are used for the diagnostic routines; pressing a test button on the device activates the isolation program, Trivex said.

The terminal controller's diagnostic program also monitors the quality of the communications portion of the system and stores the information in terms of non-acknowledgements (NAK) sent and received from the time the system was last powered, it added.

Information in the controller can be released in status report form to any of the Plus 70's display and print stations or transmitted to the user's central site, the company said from 2201 N. Glassell St., Orange, Calif. 92665.

New KODAK KOM-85 Microfilmer.

More flexible, more capable, and reliable as ever!

When you set out to improve a COM workhorse, you don't tinker with the features that made it an outstanding performer. The advanced KODAK KOM-85 Microfilmer gives you new flexibility and capability, combined with the fast, efficient throughput and high reliability of our proven veteran, the KOM-80 Microfilmer.

If your operation calls for high volume with fast turnaround, you should check into the advantages of the new KOM-85 Microfilmer.

The advanced Hewlett-Packard front-end mini-computer gives you automatic program loading and integrated job setup through a CRT data terminal. You get input flexibility to accept print-image records from virtually any computer system. Faster job setup, easier film handling.

The KOM-85 Microfilmer gives you multiple-microform-output capability, plus a new expanded page format with up to 172 characters per line and up to 88 lines per page. You get broad coding and indexing capability for roll or fiche. Optional document-related coding for automatic retrieval on 18 mm KODAK ORACLE Equipment. Flexible column indexing for fiche, and more . . .

It adds up to more flexibility, new capabilities. With throughput speed up to 24,000 pages per hour. And the extra-reliable Kodak hardware and comprehensive software to handle COM formatting.

There's even more behind your new KODAK KOM-85 Microfilmer. Thorough training and clear, complete documentation; fast, competent, on-the-spot service; responsive and responsible support from dedicated Kodak people—the kind of support that's helped us set an outstanding nine-year track record in COM.

Look into the new KOM-85 Microfilmer. See your Kodak representative, or write Eastman Kodak Company, Business Systems Markets Division, Dept. DP-66873, Rochester, N.Y. 14650.

Since you demand a lot from EDP, demand the same from COM.

Kodak

VOLUME
KEY PUNCHING
(402) 592-1688
"QUALITY AT LOWER COST"
AMERICANA
KEY PUNCH
4345 South 89th St.
Omaha, Nebraska 68127

With Users, Within Data Center

Doctrine of Separation Suggested for DP Departments

By Nancy French
Of the CW Staff

CHICAGO – Good organizational controls are important in all areas of a business, but they are particularly important in DP because they ensure the quality of the DP product as well as the financial stability of the company, according to William Murray, a senior marketing support administrator for IBM's Data Security Support Program.

Since application development controls all other operations in the DP department, DP should be formally separated from the using departments, Murray told a recent Info '76 session here.

All requests for development of new programs or changes to old ones should be authorized, tested and accepted by using departments, he said.

User departments should be accountable for ensuring the work done by the DP department is consistent with their authorization and their expectations. Source documents should be created and maintained by user departments, he added.

Separation of Duties

Not only should the DP function be separated from users, duties within DP must also be maintained separately, Murray suggested.

A person who has responsibility for job initiation should not have responsibility for data input or data output, nor should a person whose job it is to add vendors' names to a file be responsible for authorizing payments.

At best, that employee could make costly errors that go undiscovered. At worst, he could even convert certain applications to his own uses, Murray said.

It was recently discovered that a New York City programmer made a five-line change in a program which contained a one-line error. That error caused $21 million in welfare checks to be sent to dead people, Murray said.

It didn't make city officials feel much better to learn all but $7 million of those checks were recovered, he added.

In converting to new systems, DPers often recombine duties and forget why the original responsibility separations were made, he pointed out. For example, several years ago IBM replaced a batch accounts receivable system with an on-line real-time accounts receivable system.

In the batch system, the accounts receivable master record has its own customer name and address fields; people who were authorized to process accounts receivable transactions could not change those customer name and address fields.

In the real-time system, the accounts receivable record had no name and address field but merely pointed to the customer master record.

In one branch office, an accounts receivable specialist was authorized to process the return of typewriters for credit and the clearing of those credits by issuing a check. As part of an unrelated duty, he was authorized to make changes in the customer master record.

One day the employee processed the return of a typewriter for an attorney. That afternoon he opened a post office box in the attorney's name and pointed the customer master record for the attorney to the post office box he had just opened; he then caused the credit to be cleared by the issuance of a check.

After removing the check from the post office box, he changed the name and address field of the customer master record back to the attorney's place of business.

In order to cash the check, he opened a bank account in the attorney's name using the check as both identification and as an initial deposit, Murray said.

He was detected when the statement that went to the attorney showed his credit had been cleared by a check. Since the attorney had received no check, he called to inquire, and the manager was alerted.

The individual was dismissed, but not prosecuted. However, the manager, too, was dismissed for poor management, Murray said.

Honesty Not Enough

Too many employers – especially the Defense Department and banks – believe all they need do is hire honest people. Instead, they should take the responsibility for keeping their employees honest by giving them thorough supervision, Murray said.

If an employee is terminated, he should be terminated at once. One insurance company that terminated a tape librarian with two weeks' notice nearly went under because in those two weeks the individual was able to destroy the entire system of backup tapes, he said.

Operational controls provide for integrity of data and should be used to help detect and correct errors as well as ensure all data is processed, he said.

Key verification, in which source data is key entered twice, is one method, and in on-line systems conversational feedback is another.

Amdahl 470V/6 'Very Close' To Meeting Objectives: Input

By Esther Surden
Of the CW Staff

MENLO PARK, Calif. – Although Amdahl Corp.'s original objective of obtaining two times the performance of the IBM 370/168 has not been achieved, on a price/performance basis the Amdahl 470V/6 is "very close to meeting its objective" of providing twice the power for the user's money, according to a report by Input, a market research organization here.

"Generally on a price/performance basis, Amdahl does even better than the results presented on a straight performance basis," according to the report, "Assessment of Amdahl as a Viable Alternative to IBM."

"One customer cited a 1.51 performance figure on benchmarks, but quoted a 1.9 to 1 advantage over the 168 on price/performance," Input noted.

The report was based on interviews with 10 companies which are Amdahl equipment users and nine that considered the Amdahl system but rejected it. An independent benchmark run by a consultant affiliated with Input was also used as a basis of comparison.

Performance and Price Increase

The IBM 168-3 provided a 5% to 13% performance improvement over the 168-1, but also contained an increase in price which kept price/performance relatively stable, the report said.

"The attached processor system has a theoretical performance approaching Amdahl, but the increase in price still leaves the price/performance advantage with Amdahl," it added.

Five users who currently have Amdahl 470s reported the results of eight benchmarks which showed performance of the system in the range of 1.1 to 2.3 times the 370/168.

Seven of the users who rejected the systems reported 1,3 to 2.0 times the performance of the 168 in their benchmarks, the report indicated. The consultant's benchmark also backed up the results of the user benchmarks, the report stated.

The overall results "are somewhat on the high side compared with those reported in our interviews, but that is probably due to the nature of applications selected which used a substantial amount of decimal arithmetic," Input noted.

On an instruction-by-instruction basis, 18 instructions are slower on the Amdahl than on the 168. "The most significant one is Execute where the 168 is more than two times as fast as the Amdahl," the report said.

Amdahl, however, has released an engineering change which increases the performance of this instruction, it noted.

"However, most Amdahl instructions are between 1.5 and 2.5 times faster than the 168," the report concluded.

The full report costs $2,500 from Input at Suite 320, 2180 Sand Hill Road, Menlo Park, Calif. 94025.

Univac Disk Storage Subsystem Added for 1100 Systems, 90/80

NEW YORK – In conjunction with its recent announcement here of the 1100/80 large-scale system [CW, Nov. 15], Univac introduced the 8434 disk storage subsystem, which can be used with both the 1100 systems and the 90/80.

The 8434 increases the on-line storage for the 90/80 to 4.9 billion bytes and for the 1100 systems to 1.7 billion words in fixed record formats, Univac said.

The subsystem for the 1100 series includes a 5046 controller and two to 16 disk drives. For the 90/80 system, the subsystem includes a 5040 control unit and two to eight drives.

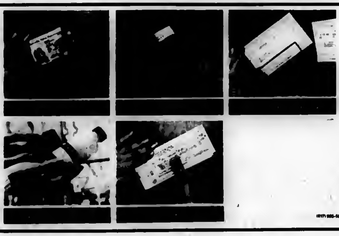
The controllers can accommodate either 8434, 8430 or 8433 drives in any combination as well as an 8405 fixed-head disk as an option, the firm said.

Each 8434 drive includes a fixed disk stack of 10 platters with 19 recording surfaces; the last surface is used for servo positioning information. Each drive can store up to 307M bytes in software-supported formats, the company noted.

A voice coil electromagnetic actuator positions the read/write heads in about 30msec; throughput is said to be 1.25M byte/sec.

The word-oriented disk control unit offers diagnostic capability via a microprogram loaded from a diskette. The byte-oriented 5040 is also microprogrammable, Univac said.

The 8434 disk subsystem in a minimum configuration with two disk drives costs $4,876/mo on a one-year rental plan or $168,600 to purchase. It will be available in April.



OCR

APPLICATIONS AT 50 CHARACTERS PER SECOND. JUST PLUG IT INTO YOUR SYSTEM. NEED WE SAY MORE?

key tronic
BLDG. 14, S.I.P., SPOKANE, WA 99216
USA (509) 928-8000 TWX 510 773-1885

PLEASE SEND DATAWAND LITERATURE TO ME AT NO OBLIGATION ON MY PART.

NAME ____________ TITLE ____________
COMPANY ____________
ADDRESS ____________
CITY ____________ STATE ______ ZIP ______
APPLICATION ____________ PHONE ______

☐ REFERENCE ONLY ○ IMMEDIATE APPLICATION ○ HAVE SALESMAN CALL

DATA ENTRY STATIONS VENDOR MODEL
INTERESTED IN: ☐ ALPHA NUMERIC
☐ NUMERIC ☐ HAND PRINT ☐ OTHER
SPECIFIC FONTS ____________
[illegible] ☐ TYPEWRITER ☐ PRINTER ☐ EMBOSSER

Multi-CPU Sites Get CPI Monitor

WATERLOO, Ont. – The DSP-190 is a minicomputer-controlled hardware monitor designed for large-scale system users or the multiple CPU shop, according to its vendor, Computer Performance Instrumentation, Inc. (CPI).

Available in three models, the monitor can concurrently produce a 128-function system profile, two working set maps at 3M sample/sec, eight additional maps at .1 MHz and tracing of system accesses to up to 700 IBM 3330-type disk drives, the firm claimed.

The unit can also control five remotely located monitors and process management reports, a spokesman added.

The three models are determined by the components involved, he noted. A Model 1 has 192 sensors, eight concentrators, four collectors, a Digital Equipment Corp. PDP-11/34 minicomputer with 64K of memory, two floppy disks, 80M bytes of 3330-type disk, a 1,600 bit/in. tape unit, graphic CRT input console with eight-color display, front-end processors and a 180 char./sec printer. It runs under DEC's RSX11-M operating system.

The Model 2 has eight collectors and the Model 3 has 384 sensors, 16 concentrators, 96K of memory, an attached measurement processor and uses a PDP-11/04 as well as the 11/34.

Hybrid Mode

In addition to performing as a conventional monitor with self-contained collection, reduction and reporting resources, the DSP-190 can operate in full Hybrid mode, CPI noted. It may be fully programmed for a particular measurement from a process originating in the host CPUs, the spokesman explained.

Software support includes a standard package of 40 management-oriented reports and a measurement syntax language which allows users to create their own applications and reports.

The Model 1 costs $164,175, the Model 2 is priced at $180,175 and the Model 3 costs $229,870. First deliveries will be in January, CPI said from 572 Weber St. N., Waterloo, Ont., Canada N2L 5C6.

Stand-Alone Printer Available From LRC

RIVERTON, Wyo. – A 40-column stand-alone printer system is available from LRC, Inc.

The Model 140 uses a dot matrix impact printing method and is controlled by a proprietary MOS interface chip which includes a 48-character buffer, a character generator and control logic, LRC said.

Character width and density can be changed at any time – even during printing – through external commands, according to the firm.

Options include RS-232C or current loop communications interfaces, pin-feed platen, high-speed paper feed, label printing and front-feed document printing.

The unit costs $495 from the firm at Technical Research Park, Riverton, Wyo. 82501.

Prepare for the CDP Exam
1001 questions (and answers) to assist you to prepare for and pass the CDP Exam. This book, developed and compiled by Ken Lord, CDP, former President of SCDP, is the newest, most current and state-of-the-art guidance available for CDP Candidate preparation.
This expanded version of the highly successful SCDP Candidate Assistance Program is now available in book form.

The New Division
Box 913
20 Middlesex St.
No. Chelmsford, MA 01863
$30 prepaid; $35 invoiced

Dual Processors Hold Surprises

By Don Leavitt
Of the CW Staff

SAN DIEGO – The Bonneville (Ore.) Power Authority studied the changes in its DP environment as a result of shifting to a multiprocessor system and the results held some surprises, according to an analyst for Control Data Corp. who worked on the project.

The upgrade took place in September 1974 and involved moving from a CDC 6400 to a 6500, which is the same system with a second 6400 CPU, Michael A. Gray told the Computer Performance Evaluation Users Group (CPEUG) here recently.

The addition of two more disk units in late October 1974 "had a considerably smaller impact" than the second CPU did and, since the work load remained approximately equal, the performance changes were quite directly attributable to the second CPU.

Within a year of the change, data collected by the system log and by a software monitor written in-house showed a 25% increase in batch throughput.

Other statistics showed the system was I/O-bound for batch work and, as previous studies had indicated, this was enough to limit the throughput increase, he explained.

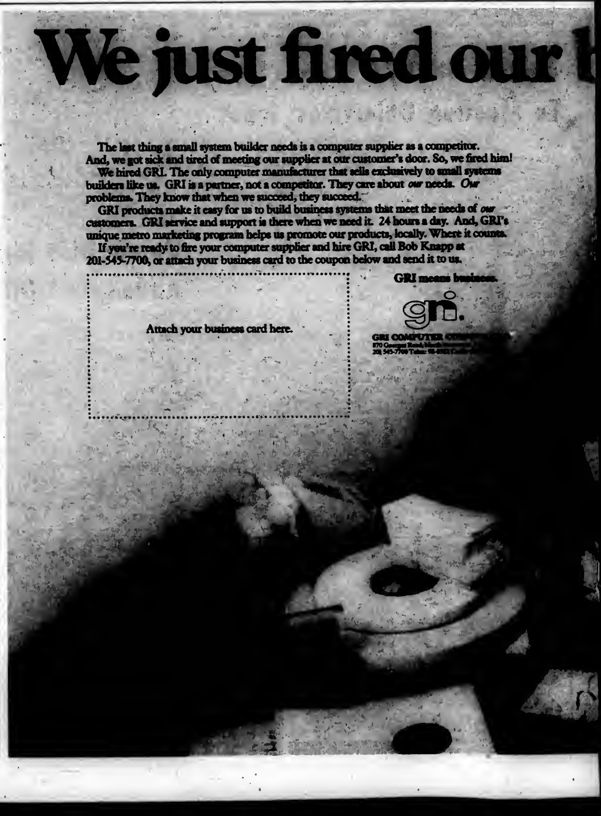
A "considerable increase" in log-ons and time-sharing CPU hours showed the second CPU had a major impact in this area. The logic of the Scope 3.3 operating system allowed a split of the batch and time-sharing jobs and the second CPU enabled each stream to use one CPU.

Throughput for time-sharing, therefore, increased sharply, he said.

An "interesting effect" of the high utilization of one CPU being split between the two CPUs was that there was only a slight increase in CPU hours divided by wall clock hours with the addition of the second CPU, Gray continued. In effect, the single CPU "appears to have degenerated" into two lower utilization CPUs.

The percentage of one CPU's work for batch had decreased while the time-sharing percentage nearly doubled, he said, noting the slack in the batch utilization was taken up "almost completely" by the second CPU.

Main storage is "very highly" utilized, but decreasing the main storage use – which "could lead to considerable improvement" – depends strongly on peripheral processing unit (PPU) activity, Gray said.



We just fired our

The last thing a small system builder needs is a computer supplier as a competitor. And, we got sick and tired of meeting our supplier at our customer's door. So, we fired him!

We hired GRI. The only computer manufacturer that sells exclusively to small systems builders like us. GRI is a partner, not a competitor. They care about *our* needs. *Our* problems. They know that when we succeed, they succeed.

GRI products make it easy for us to build business systems that meet the needs of *our* customers. GRI service and support is there when we need it. 24 hours a day. And, GRI's unique metro marketing program helps us promote our products, locally. Where it counts.

If you're ready to fire your computer supplier and hire GRI, call Bob Knapp at 201-545-7700, or attach your business card to the coupon below and send it to us.

Attach your business card here.

GRI means business.

gri.

GRI COMPUTER [illegible]
870 [illegible]
201 545-7700 Telex: [illegible]

Baking Firm Whips Up Savings With Data Entry System

By Alan W. Hawkins

Special to Computerworld

COLLEGEDALE, Tenn. – The conversion from IBM keystations to a Univac 1900 Computer-Assisted Data Entry (Cade) system at the McKee Baking Co. here has increased keystrokes by about 2,000 per hour while allowing the firm to catch about 75% of the key errors through verification.

McKee is a privately owned snack cake baker which makes Little Debbie Snak Cakes, distributed to over 42 states.

The decision to upgrade from the two IBM 3742 keystations and the one 3741 with a 3747 tape converter used to convert the data to tape for input into the company's Univac 9480 mainframe was reached for a variety of reasons.

The IBM systems offered limited editing capabilities and the DP department wanted to do value ranges and table lookups.

Also, data had to be input into the system in a very structured way and the firm wanted the operators to be able to enter the data as it appeared on the input document.

Reluctant to Relinquish

The key operators were very reluctant to give up the 3740s because they were fast and easy to use. However, the firm needed to be able to provide additional editing at data entry time.

At first, McKee decided to try a distributed network system from Datapoint Corp. The system didn't work because the firm's software did not provide the response time required for the batch data entry applications run at the baking company.

The company felt it didn't need the extra added capabilities of the distributed system and, after two months, the system was scuttled.

McKee then considered systems from Entrex and Keydata as well as the Univac Cade system, but found that neither the Entrex nor the Keydata system could keep up with the speed required by the firm.

The next step was to order and install a Univac 1900 Cade system with six keystations. At installation the systems cost $13,065/mo. A subsequent upgrade of 8K of memory, bringing the system to 57K bytes, and the addition of eight keystations has increased the monthly cost to $21,091.

The company is pleased with the way the conversion turned out. It took about two weeks to write the programs (approximately 10) for all the applications already running on the 3740s, plus a few additional ones.

Now, about 55 programs are on the Cade system.

The largest application is the billing, during which 7,000 document/day are processed.

Check reconciliation, a garage repair system for the firm's trucks, a trip record system for the salespeople, accounts payable and several master update applications are also run on the system.

The average keystroke rate is now about 18,000- to 20,000 keystroke/hour and two operators key over 24,000 keystroke/hour with less than .05% verifiable error rate.

The edits in the system down the line indicate that the system is catching about 75% of key errors through verification.

The average keystroke rate on the IBM systems was between 16,000- and 18,000 keystroke/hour.

Happy With Operation

The key operators are happy with the way the terminal operates.

Increases in volume have less impact on workload because of the faster keying rates and the cleaner data that goes to the computer room. Some applications required three or four punched cards per transaction and the firm can now key these items in one pass.

In most applications, there is less data to key because keying of duplicate fields has been eliminated.

Another advantage is that the company can key data as it appears on the source document and reformat it internally for output.

Hawkins is DP manager at McKee Baking Co.

DataComm 77

Washington is where it's at!

Want to know how other datacomm users and consultants solve problems? Come to DataComm 77, Sheraton Park Hotel, Washington, D.C., March 9-11, 1977. Leading users will be on hand to brief you on ways they put datacomm to work. Here are some of the speakers:

S. Westall, Aetna Life, Optimizing Terminal Networks

Gary R. Audin, Dir., Applications Development, PRC Public Management Services
Gerald H. Sheef, Sr. Telecommunications Engr., Sun Oil Company
John Dugger, Consultant, Securities Industry Automation Corp.
Harvey S. Hershkowitz, V.P., Chase Manhattan Bank, N.A.
Arthur D. Hall III, President, Arthur D. Hall Associates
W. Allen Edwards,, President, Systems Design Associates
Steve Westall, Data Communications Advisor, Aetna Life and Casualty
John H. Horton, Computer Specialist, Fleet Material Support Office
Dr. Franklin F. Kuo, Asst. Dir., Teleprocessing and ADP, OOTACCS, Office of the Secretary of Defense
Roxanne Williams, Dir. of Plans and Policy, Office of Automated Data Systems, U.S. Department of Agriculture
Edward J. Istvan, Assoc. Dir. for Telecommunications Technology, The Institute for Computer Sciences and Technology
Dr. Michael Muntner, Asst. Commissioner, Automated Data and Telecommunications Service, General Services Administration
Shirley W. Watkins, Computer Networking Section, National Bureau of Standards
Joanne Kim, Mgr. Network Control Center, National Security Agency

And, there are many more. Including representatives of Government agencies who will fill you in on legislative and regulatory matters every datacomm user should know about. For more information on this annual Conference and Exposition, write DataComm 77, 60 Austin Street, Newtonville, MA 02160. Or call (617) 964-4550 collect.

DataComm 77 is organized by the Association of Data Communications Users, Auerbach Publishers, Canadian *Datasystems, Computer Decisions, Computerworld, DataComm User, Datamation,* and *Infosystems.*

DataComm 77

Where the action is!

Bits & Pieces

Fabri-Tek Add-On Memory Designed for DEC PDP-11

MINNEAPOLIS – The Add-In 11 from Fabri-Tek, Inc. is an OEM semiconductor add-on memory system for the Digital Equipment Corp. PDP-11 series.

The Add-In 11, which uses dynamic MOS technology, is plug-compatible with the PDP-11/04, 11/05, 11/34, 11/35, 11/40, 11/45, 11/50 and 11/55, the company noted.

The system is offered in a 16K by 18-bit or 16K by 16-bit configuration contained on a printed circuit board that plugs into the PDP-11.

Memory capacity can be increased in 16K increments up to 128K words and memory operation can be interleaved on 4K boundaries, the firm said.

The 16K by 18-bit version with on-board regulator for the 11/05 through 11/55 costs $1,250; the 16K by 16-bit version for the 11/04 to the 11/34 costs $1,185, the firm added.

Fabri-Tek is at 5901 County Road 18, Minneapolis, Minn. 55436.

Med-E-Comp Adds Mini for Doctors

HURST, Texas – A turnkey minicomputer for use in doctors' offices and based on an Interdata, Inc. 6/16 CPU has been introduced by Med-E-Comp Corp.

Physicians can display their own forms on the CRTs, the firm said.

Medical records, billing, accounts payable, taxes, payroll and insurance packages are available for the system.

A basic system includes a 6/16 CPU with 65K of core memory; 5M bytes of disk expandable to 200M bytes; a CRT; matrix printer; and a backup cassette tape storage system, the firm said.

The system costs under $16,000, it added.

Med-E-Comp Corp. is at Dept. C-6, 632 Bedford Euless Road, Hurst, Texas 76053.

Tion Announces Burster

OAKLAND, Calif. – A burster designed for use with small-business systems is available from Tion Co.

The 260B has a tear bar that measures forms length, aids forms feeding and is "virtually jam proof," the firm claimed.

The bar is combined with a transparent safety cover which can only be raised by lifting the paper width guides and closed by pulling the safety release knob, the firm said.

Operating at either 82 ft/min or 125 ft/min, the unit can handle single-part continuous forms.

Tion is at 262 Grand Ave., Oakland, Calif. 94610.

Family of Three Machines

Varian V77 Aimed at Multi-CPU Nets

By Esther Surden
Of the CW Staff

IRVINE, Calif. – A family of minicomputers ranging in size from an OEM CPU on a board to an end-user supermini has been introduced by Varian Data Machines here.

The three upwardly compatible microprogrammed CPUs announced recently were designed to allow users to structure "multiprocessor networks of tightly coupled computers," the firm said.

They are suited for use in aerospace, financial, governmental, scientific or university environments, a spokesman added.

The family was developed to give the user three ways to build multiprocessor systems – through shared memory, through intercomputer I/O bus connections and through serial communications channels, the spokesman noted.

Called the V77-200, V77-400 and V77-600, the CPUs are software-compatible with current Varian minicomputers, he added.

Common features throughout the V77 family include use of a dual data bus, microprogramming, 32-bit arithmetic capability, a 187-instruction set and byte, word and double-word addressing.

Hardware multiply/divide, 64-vectored interrupts, direct memory access (DMA), a real-time clock, automatic program loading and the capacity to accommodate CRT or teletypewriter controllers are additional common features, the spokesman said.

For communications and networking applications, a data communications multiplexer and its associated line adapters provide a universal communications hardware interface for the V77 family, the company noted.

Megamap Option

The 600, the top-of-the-line V77 model, is on the level of a Data General Corp. (DG) Eclipse or a Digital Equipment Corp. PDP-11/70, the firm claimed. It features a 370 nsec, 1K-word cache memory with a 90% hit rate, the spokesman said.

Using the Varian Megamap memory mapping option, the 600 can accommodate up to 1M words of 660 nsec MOS main memory, Varian said.

Up to 4K words of writable control store (WCS) can be accommodated by the 600, he added, noting the microinstruction is 64 bits wide.

A floating-point processor which performs single- and double-precision as well as floating-point arithmetic is available for the 600. Floating-point processor transfers are made through DMA, the firm noted.

The 600 also has all of the characteristics of the smaller 400, which is said to perform at the level of the DG Nova 3/12 or the more powerful range of DEC PDP-11/34s, the spokesman said.

The 400 features power fail-restart, memory protect, and dual-port memory capacity for shared-memory applications. It can accommodate up to 256K words of main memory without memory mapping and up to 1M words with the Megamap option. Byte parity is available for main memory, according to the spokesman.

The WCS feature on the 400 allows users to generate their own microinstructions with a standard microprogram software package. The WCS for the 400 has storage locations for a maximum of 3K 32-bit microinstructions, he noted.

The dual-port shared memory introduced allows the CPU to directly access memories of other V77 systems.

High-speed peripherals can be linked directly to the memory bus, which transfers data at 1M word/min, he added.

CPU on a Board

The V77-200 CPU on a board is said to offer performance in the range of a DG Nova 3/4 or a DEC 11/34 on the low end of the line.

The 200 can accommodate a maximum of 32K 16-bit words of 660 nsec MOS memory. Memory is expandable in 8K, 16K or 32K increments packaged in a chassis with a power supply and I/O controllers, the firm said.

Users of the 200 can upgrade to the 400 by substituting processors, Varian said.

The systems run under the Varian Omnitask Real-Time Executive (Vortex) and Vortex II mulitprogramming operating systems. Communications take place via the Vortex Telecommunications Access Method.

The V77-200 costs $1,200 for the processor board only or $7,600 for a chassis-mounted CPU with 32K of memory and V77 family standard features. The 400 costs $10,100 with 32K words of memory.

The 600 with 64K, 16-bit words of memory costs $22,450.

All systems will be available in the first quarter. Varian is at 2722 Michelson Drive, Irvine, Calif. 92713.

Reality II From Microdata Designed for Small Businesses

CHICAGO – Microdata Corp. introduced a small business system at the low end of its Reality product line and a line printer at Info '76 here recently.

The Reality II is a limited-expansion system aimed at businesses smaller than those which have traditionally used Reality products, the company said. The basic configuration includes the 1600 CPU, 16K bytes of main core memory, 5M bytes of virtual disk memory, 5M bytes of file store memory, a Prism display terminal and a Scribe 120 char./sec matrix printer.

The system is expandable to a maximum of 32K bytes of core memory and can accommodate two additional terminals, according to a Microdata spokesman. A user can also select remote slave matrix printers for use with a Prism on any of three I/O ports, he added.

Priced at $31,000, the Reality II will allow users to upgrade through the entire reality line, the vendor said.

The Scribe line printer is manufactured by Applied Computing Technology, acquired by Microdata last week as a wholly-owned subsidiary.

The printer, which has optional interactive graphics capabilities, utilizes a 4-bit microcomputer controller for its 9 by 7 dot matrix and prints an Ascii 96-character line. It has a 320-character internal buffer for storing over two full lines of data, the spokesman noted.

Optional features include 165 char./sec speed, horizontal and vertical addressable head positions, half- or full-duplex operation and a keyboard for the operation of a byte-parallel system console.

Additional interactive graphics options include a parallel or serial RS-232 I/O interface, a keyboard for terminal operation, full incremental plotting and foreign language capabilities, the firm said.

The 120 char./sec printer priced at $2,910, is also available in OEM quantities for $1,950 each.

Talk Turnkey

Is your system dedicated? Do you have a turnkey application that is of interest to others?

Computerworld is seeking manuscripts for a special report on dedicated systems to appear in the issue of Jan. 31. Deadline for the material is Dec. 20.

Please send double-spaced typed manuscripts to Esther Surden, Associate Editor/Miniworld, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

Write simulation programs in FORTRAN.
Debug COBOL programs.
Do engineering calculations in BASIC.
Do actuarial simulations.
Build an inventory-control data base.
Develop real-time data acquisition systems.
Randomly access a billion-byte data base.
Prepare documentation with an interactive text editor.

One Prime computer does it all.

And it's all done simultaneously on a Prime CREATE computational timesharing system. There are six entry-level packaged systems in the CREATE series, ranging in price from $35,000 to $200,000. It's amazing what one Prime computer can do. To find out what one can do for you, call or write to:

David R. Johnson, Product Manager,
Prime Computer, Inc., Box 2600,
Framingham, MA 01701,
(617) 879-2960.

PRIME

This computer is simultaneously handling 20 interactive foreground jobs, 16 batch background jobs, and 2 printer spooling jobs, while talking with a large mainframe and 4 other computers like itself.

Of course, at $99,600 it's one of our more expensive models.

The computer is SyFA.
The creator is ComputerAutomation.
And the way it can handle your own specific distributed data processing problems is another price/performance story in itself.

For the complete, unabridged SyFA story, write:
ComputerAutomation, Commercial Systems Division,
18651 Von Karman, Irvine, California 92713.

ComputerAutomation
Commercial Systems Division

It All Started With T/S

Growth Forces Small Firm to Switch to Larger Mini

MINEOLA, N.Y. – Expansion caused by unprecedented growth is a problem facing many small firms as they develop. For Van Wyck International Corp. here, expansion meant taking out the limited-capacity small business system it had been using since 1972 and putting in a larger minicomputer.

"Our strength has been service," according to Irwin Septimus, executive vice-president for the supplier of electrical kitchen appliances.

"To give service, you need information – the right information – quickly," he said, adding the small system was getting bogged down and not providing the necessary information.

The firm's DP history goes back about eight years, when it decided to do something about its ballooning paperwork problem. Time-sharing seemed to be the solution, but even a switch from one time-sharing company to another didn't provide the information Van Wyck needed.

Finally, the firm made the leap to an in-house system in 1972.

First Expansion

A Basic Four Corp. Model 400 system was installed in Mineola to handle order processing, billing, inventory control, accounts receivable and sales analysis. This workload began to grow very quickly, and the system expanded from 4.2M bytes of disk storage and two CRTs to 12.6M bytes of storage and four CRTs.

But even this large increase was insufficient, Septimus said. During peak season, open order files had to be maintained on three separate removable disk packs. A monthly sort of sales performance required about 60 hours.

As sales continued to rise – from $14 million in fiscal 1975 to $24 million in the most recent period – the volume of paper increased and information too frequently was lagging.

"Two areas in particular had to be upgraded," according to Donn Liles, president of Data Basics Corp., Van Wyck's consultant and software supplier.

"First, management was always frustrated by inadequate information on the status of open orders, obviously a critical factor when you depend heavily on customer service as a prime weapon in your battle against competition. Second, the system was very slow in sorting; it was difficult to get meaningful after-the-fact data on sales, shipments, etc. in sufficient time to react."

Second System

So the decision was made to move on to another in-house system based on the recommendation of its sccounting firm and; in January of this year, work began to convert to the Micos minicomputer with Data Basics providing programming. The Micos system, from Mini-Computer Systems, Inc., offered more total capacity, Liles explained.

The system, installed in April, includes a CPU with 64K bytes of core, two 80M-byte disk drives, four CRTs and a 600 line/min printer.

Though costs, including those for applications software, are about the same as for the Basic Four system, the Micos system offers about 12 times the on-line disk storage, three times the print speed and, for certain applications, faster internal processing speeds, he said.

A number of new reports and processes were instituted immediately, including shipments by state, sales by salesperson and customer and open order inquiry.

In the near future, other items will be sdded, including a magnetic tape interface with Van Wyck's factoring concern; payroll; in-process inventory and bill of material control; raw material inventory control; material requirements planning; purchasing; accounts payable and magnetic tape interface for automatic microfilming of transactions and reports.

One of the virtues of Micos, Liles said, is that it can be expanded at low cost.

Meanwhile, Van Wyck is pleased with the advances already made. The monthly sales analysis that used to take 60 hours is now available in 20 minutes, Septimus noted.

Nova/Eclipse Subsystem Allows Mix of Cartridge, Floppy Disks

SOUTHBORO, Mass. – Data General Corp. (DG) has introduced a cartridge disk subsystem which it said allows mixed cartridge disk and floppy disk configurations and can be dual-ported for shared configurations.

The subsystem was designed for use with the firm's Nova and Eclipse minicomputers.

The subsystem can contain 10M-, 20M-, 30M- or 40M bytes of storage. Up to four disks or floppies can be mixed on a controller. A switch allows users to manually select drives, the firm added.

The dual-porting feature is said to allow the configuration of dual-processor shared disk systems using standard equipment and software. It is optionally available and can be added at the user's site, DG said.

The system is supported by all DG real-time operating systems, a spokesman added.

A single-drive subsystem including a cartridge disk drive, integrated power supply, controller and cabling costs $9,950. A 20M-byte subsystem costs $17,950, the firm said.

The subsystems are available immedlately from DG in Southboro, Mass. 01772.

FIND MINI-SOFTWARE SERVICES FAST

MINICOMPUTER SOFTWARE DIRECTORY

instant access to descriptions of hundreds of minicomputer software packages and services.

DIRECTORY INDEXED 4 WAYS

- Indexed by applications and services
- Profiles of supplier companies
- Geographic locator
- CPU's supported by suppliers

Annual Subacription $70

INITIAL ISSUE plus 2 updates Send check or PO

MINICOMPUTER DATA SERVICES
20 COVENTRV LANE, RIVERSIDE, CT. 06878

1978 EDITION

Another good reason for taking part in the 1977 Computer Caravan:

Your selling strategy can encompass your total product line.

When you're selling at the Computer Caravan, your booth is a complete showroom/sales office where you can give new prospects working demonstrations of a complete selection of your products. Unlike a routine sales call, you're not limited to a single-product presentation.

You can also use your Caravan exhibit to increase awareness of improvements and additions to your total product line among your current customer base. Your booth is an excellent way to show your current users how they can grow with their present system— and your organization.

For complete information on how the Caravan can work for you, write us. Just use the coupon, or call Roy Einreinhofer at (617) 965-5800.

NINE COMPUTER SHOPPING CENTERS THAT BRING THE BUYERS TO YOU
March 29 - June 9, 1977 • San Francisco • Los Angeles
Cleveland • Minneapolis/St. Paul • Chicago • New York
Philadelphia • Washington, D.C. • Boston

COMPUTER CARAVAN 77
Sponsored by COMPUTERWORLD

To: Roy J. Einreinhofer
National Sales Manager
The Computer Caravan
797 Washington Street
Newton, MA 02160

☐ *Please send me more information on exhibiting in the 1977 Computer Caravan.*

Name ____
Title ____
Company ____
Address ____
City ____ Zip ____
State ____
Phone ( ) ____

“Our new NCR Criterion went in without a ripple. No conversion. No parallel operation. It was just load and go.”

Jerry Lindee, Director of Information Systems
Dart International, Los Angeles, California

The prospect of a difficult conversion can lock you into a system long after you really need better performance. Unless you have an NCR system.

Dart International, specializing in warehousing, consolidation, transportation and leasing, operates realtime 24 hours a day, five days a week. One day the NCR Century went out and the NCR Criterion went in. Five months later, the Criterion is still operating with up to 22 percent more thru-put and a record of 99.95 percent uptime. Quite an accomplishment for the first installation of a new generation.

NCR offers compatibility, not only from model to model, but from generation to generation, from NCR Century to NCR Criterion. NCR designs with your interests in mind.

To find out what the Criterion can do for you, phone your local NCR office. Or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

NCR
Complete Computer Systems

GO

CI Notes

Milgo Shuns Adds Merger

MIAMI – Milgo Electronic Corp. has rejected a merger proposal from Applied Digital Data Systems, Inc. (Adds).

Milgo's board of directors, which voted unanimously to reject the proposal, told Milgo "the merger proposal is not in the best interest of the shareholders and did not reflect the long-term prospects" of Milgo, according to a Milgo spokesmsn.

Under the merger proposal, Adds contemplated taking over Milgo, offering 1.5 shares of its common stock for each share of Milgo. The transaction would have been valued at around $50 million.

William J. Catacosinos, Adds president, said the transaction was proposed as a merger designed to be a tax-free reorganization.

Adds had sales of $17.8 million in its last fiscal year and reported a 53% increase in earnings and a 40% rise in sales for the nine months ended Aug. 31. Milgo reported sales of $40.4 million in 1975, but esrnings dropped 56% and sales 3.4% in the nine months ended June 30.

Memorex, Quantor Pact Set

SANTA CLARA, Calif. – Memorex has entered into an agreement with Quantor Corp. for the sale of Memorex 1603 computer output microfilm (COM) printers and 1620 film duplicators to Quantor.

The equipment will be marketed under Quantor's name as part of its total COM system product line; Memorex will provide maintenance for units installed in the U.S.

Quantor chose the Memorex products because they plug directly into IBM 360/370 systems, according to Charles Askanas, Quantor president.

Supershorts

GTE Sylvania, Inc. is providing digital technology training to 150 civilian engineers and technicians employed by the U.S. Navy.

– – –

Data General Corp. delivered its 1,000th Eclipse computer to Societe Generale at the bank's London office.

– – –

Computer Automation, Inc. has appointed Dycor Data Systems Ltd. as exclusive distributor for the Syfa system in Canada.

During 1971-75 Period

Study Shows Four Makers Grew 38%

By Molly Upton

Of the CW Staff

NEW YORK – Four mainframers experienced a 38% average rate of growth in the installed base of their large configurations during 1971-1975, according to a report from L.F. Rothschild & Co., an investment and brokerage house here.

The large configuration market, made up of those systems valued at $2.9 million to $3.5 million, comprised about 23% of the total 1975 installed base of four vendors: IBM, Burroughs, Univac and Honeywell Informstion Systems (HIS), the report indicated.

IBM and Univac each attained 41% of their growth in this area during the five years, followed by HIS with 29% and Burroughs with 22%, according to Rothschild.

Using data supplied by Internstional Data Corp., Rothschild divided the systems market into seven classifications of systems sizes and among the four mainframers.

Spread Only 9%

There was only a 9% spread among the four in the size of their bases devoted to large configurations, the report showed. IBM, the leader, had 25% of its base in large configurations while Burroughs, which held the smallest portion, had 16% st the end of 1975.

The division of market share in this area remained relatively static between 1971 and 1975, with IBM going from 79.8% to 78.4% while Burroughs started at 3.4% and edged to 3.9%.

Univac managed to grow from 7.5% to 8.7% while HIS dipped from 9.3% to 9%, according to the report.

In the very large configuration sector, which experienced the next highest growth rate of 22% during the five years, IBM and Univac pretty well carved up the market between them.

For systems valued at $4.6 million to $9.6 million, IBM held 71.5% of the market in 1975, up from 65.4% in 1971, while Univac slipped to 25.6% from 34.3%. Very large configurations represented 11% of the four makers' installed base at the end of 1975.

The only area with a negative growth rate during the five-year period was the medium-small category, composed of systems costing $130,000 to $370,000.

As a percentage of total growth during

(Continued on Page 31)

CLASS	1	2	3	4	5	6	7
IBM	2% 1%	23% 10%	(6%) 6%	(1%) 28%	16% 17%	41% 25%	23% 10%
Burroughs		12% 5%	1% 16%	33% 38%	26% 21%	22% 16%	6% 2%
Univac*		(7%) 7%	(2%) 9%	23% 15%	(5%) 10%	41% 23%	60% 30%
HIS		12% 8%	(6%) 20%	18% 32%	45% 16%	29% 20%	4% 1%
TOTAL	2% 1%	16% 8%	(5%) 11%	5% 28%	20% 17%	38% 23%	22% 11%

L. F. Rothschild & Co.

Key A / B

For each vendor:

A = Class as a % of total growth 1971-1975.

B = Class as a % of installed base 1975 year-end.

* - 6% of Univac Installed Base = Misc. Categories.

Chart pinpoints four mainframers' rates of growth in seven configuration sizes. It also shows what percentage of a vendor's base is in each category.

Vendors Not Quite Harmonizing On Common Definition of DDP

By Toni Wiseman

Of the CW Staff

CHICAGO – The definitions of distributed data processing (DDP) at the recent Info '76 here were as numerous and varied as the vendors.

While all agreed DDP depends on a communicating network of hardware, the consensus stopped there, with each vendor varying the scenario slightly dependent on his products' special capabilities.

John R. Bonne, director of data systems marketing at General Automation, Inc. (GA), said DDP "is merely the distribution of an intelligent processing capability to different geographic or functional locales, with each of these distribution points being large or small in terms of processing power and each with a potential for growth or expansion as the application demands."

A DDP network as he envisions it can be comprised either solely of minicomputers or of minis communicsting with a host computer. GA, he noted, sells systems for both configurations.

The company is primarily selling sys-

(Continued on Page 32)

Are you sure you're getting the best S/360-370 deal?

ReTHINK

If you do business with Comdisco, there's no doubt that you'll get the best deal. We're the largest IBM computer dealer in the world. We got that way because we take professional pride in satisfying our customers. We're responsive, understanding, and want to see you get the most from your computer investment.

If you're buying, selling, leasing or trading IBM computers, think about Comdisco first. It's the best way to make sure you're getting the best deal.

You're making me re-think.
I'm interested in
☐ Buying ☐ Selling
☐ Leasing ☐ Trading
The following equipment ____________
____
Name ____________
Title ____________
Company ____________
address ____________
city ________ state ______ zip ______
phone ____________

COMDISCO
9701 W. Higgins Rd.
Rosemont, Ill. 60018 (312)698-3000
NEW YORK: (201)568-9666
SAN FRANCISCO: (415)944-1111

Consumer's Market

BEDFORD, Mass. – The tape market "is a real Ralph Nader market; the consumer is getting more for his money," according to Sig Tolman, planning manager at BASF Systems.

The margins in the tape business have been diminishing, John Healion, director of marketing, said in explaining the projected price hike by BASF at the end of this year [CW, Oct. 25].

The prices of raw materials for items such as polyester film have increased as much as 20%, he said, and further price hikes are expected.

The tape market has become increasingly price-competitive, giving no relief from the pressure applied by price hikes in raw materials, he remarked.

The overseas market reflects the same competitive situation, he added.

Energy Crunch

Tape prices were lowest at the end of 1973, Healion said, and then the energy crunch and its concomitant raw material price hikes raised them somewhat at the end of 1974.

Although current prices are now as low as in 1973, "they're not far from it," he said, although raw material prices are higher.

Healion estimated the tape market is growing about 5% to 6% per year and also shifting to smaller systems.

The firm's flexible disk line is doing well, he said. BASF supplies primarily IBM-compatible diskettes but will make them to an OEM's specifications, he said.

BASF Sees Trend to 'Winchester' Disks

By Molly Upton
Of the CW Staff

BEDFORD, Mass. – The OEM market for Winchester-type units looks "very, very good and is growing rapidly," according to John Healion, director of marketing at BASF Systems.

Helping to compensate for the trend among users of large IBM systems toward fixed disks is the increased demand by users of minis and midis for removable disks, such as 11-high platters, Healion said.

Predictions Erred

As a result, BASF's predictions that sales of its 11-high packs would decline rapidly as of the end of 1975 didn't materialize. Minis and Midis from such firms as Hewlett-Packard Co. and Digital Equipment Corp. are incorporating versions of 11-high drives, he said.

Rather than falling dramatically, the 11-high market is somewhat flat, he added.

In response to the higher than projected demand, BASF started refurbishing and selling packs that came in off lease, according to Sig Tolman, planning manager.

Another reason for the 11-high's popularity, he added, is that the East European market peaks at different times than the U.S. and thus offers additional market opportunities.

Sales Force Expansion

BASF is planning to expand its sales force in order to handle the increasing number of prospects represented by the smaller systems market such as the IBM 3/12, 3/15 and smaller 370s, Healion said.

In addition, the firm is seeking to place more technical expertise in the field to keep up with the increasing complexity of products, such as Winchester-type devices.

BASF, the first independent to ship a Winchester-type module, is supplying these to various OEMs, he said.

Gearing Up Took Time

Gearing up to making a Winchester-type unit took some time, Healion recalled. Previously, magnetic particles on a disk were arranged randomly, but in a Winchester-type unit the particles are aligned in the direction in which the recording is done. Also, the coating is extremely thin.

But production is flowing very well, he said, adding he expects the techniques learned from making Winchester-type units will be incorporated into other types of disks.

BASF's revenues are pretty evenly split between flexible and hard media, Healion said. In addition to disks, the plant makes floppy disks and computer and audio tape in reels and cassettes.

Four Makers' Bases Average 38% Growth

(Continued from Page 30)

the five years, this category declined 5% and comprised only 11% of the installed base at the end of 1975, according to Rothschild.

Medium Market

The medium configurations – those with price tags ranging from $480,000 to $960,000 – had an average growth of 5% for the four makers during 1971-1975; IBM experienced a 1% decline in this category when viewed as part of its overall growth pattern.

But while IBM declined, Burroughs experienced 33% of its growth in this sector and had 38% of its installed base in the medium sector.

IBM's market share declined from 80.9% in 1971 to 75.3% in 1975, while each of the other three mainframers increased their shares in the medium configuration category. At the end of 1975, HIS had 12.6%, Univac 4% and Burroughs 8.1%, Rothschild indicated.

HIS experienced 45% of its growth in the medium-large sector, comprised of machines costing $1.2 million to $1.8 million, the report said. HIS had 19% of its total installed base in this area in the end of 1975, Rothschild said.

In terms of market share, IBM dropped from 80.1% to 74% and Univac declined from 9.9% to 6.7%. HIS grew from 4.1% to 12% while Burroughs rose from 5.8% to 7.3%, the report showed.

LARGE VOLUME
KEYPUNCH/KEYDISC
SERVICES

Quality Data
at Competative Prices

DATA-MIDWEST
3030 METRO DRIVE
MINNEAPOLIS, MINN. 55420
612-854-1800
A DIVISION OF DATA SYSTEMS INC.

ECONOMY PACK

Before you buy a PDP 11/05, 11/34 or 11/45, or an Eclipse* or Nova* system...

Check the new Interdata Pack/16 and Pack/32 Packaged Systems. They're easier to use and cost less.
Pack/16 includes a 16-bit Model 6/16 CPU with 64KB memory. Pack/32 has a 32-bit Model 7/32 with 128KB memory.

Easier to use. We install each Pack as a totally integrated hardware and software system. It's ready to run immediately. Each system includes a CPU with 10MB disc, 400 CPM card reader, 200 LPM line printer and Carousel 30 terminal. Plus complete software based on the Interdata multi-tasking operating system and extended FORTRAN.

Cost less. Judge for yourself: Pack/16 costs $33,500. Pack/32 costs $43,500. Prices include installation and 90-day full service warranty. And, we deliver in 30 days.

Write. Or call our toll-free number: (800) 821-7700 Ext. 331. In Missouri, call (800) 892-7655 Ext. 331.

INTERDATA®
Interdata, Inc.
Subsidiary of PERKIN-ELMER
Oceanport, N.J. 07757

*Nova and Eclipse are registered trademarks of Data General Corporation

Vendors Differ on Distributed Processing Definition

(Continued from Page 30)

tems that are stand-alone minicomputer networks, not front-ending to a host, he said, but there are certain large computers that may tie into the net.

In the future, the network itself will become the processing medium and what was formerly the host will just become another node in the network, Bonne predicted.

Networks will replace host computers and front-end types of systems along with the evolution away from centralized data bases, he said, noting the Bank of America is distributing a data base of 25 billion characters into over 30 different systems.

"With minis and micros now supporting large file systems, there is less and less of a reason for having one centralized data base," Bonne believes.

The evolution at GA is toward large communication networks that are very modular, he said. The modules, which may have one, two or up to six minicomputers, will handle redundancy, recovery and nonstop operation as GA begins to provide software enabling the modules of multiple minis to work together as a single processing entity.

Power Near Transaction

Ed Gistaro, vice president of marketing for Datapoint Corp., said DDP is "the concept of putting computer power closer, if not at, the actual site of business transactions."

DDP "came about with the availability of low-cost, easy-to-use computers that were operator-oriented, not Buck Rodgersish," he added.

The main function of the mainframe in Gistaro's concept of DDP is data base maintenance, which provides a central focal point, while distributed points maintain regional or departmental data bases as well.

"We're not talking about usurping mainframes, but rather about making data more usable by cleaning it up before it gets to the mainframe," as well as putting data back into the hands of the people who need and are interested in it, he said.

Eyeing the future, Gistaro said vendors must keep in mind that users have spent so much time and money getting their act centralized they cannot decentralize overnight.

Donn Ulmer, president of Century 21 Data Systems, a Microdata Corp. distributor, thinks the entire concept of DDP evolved because users could not control information from a central standpoint and were not getting the response time they needed.

Microdata's approach to DDP is to provide a stand-alone system with communications capabilities because of the power inherent in the system, he said. The firm is not dealing with "General Motors" companies, but with unique entities for which communications on a batch basis is sufficient, he noted.

Microdata's system will allow on-line operations, he added, but the firm is selling more batch systems because of the lower cost.

Minis will be accessing a central data base to a certain extent, but to a much greater extent each installation will maintain its own information, in Ulmer's schema.

"The concept is young enough now that it will take a couple of pioneers to get it truly off the ground," he said, noting that for "political" reasons "number crunchers" will stay around for a while because DP centers will have to justify their in-house IBM 370s and because they want to maintain overall control.

But, he added, this will be harder and harder to do as more minis capable of handling 5M-byte data bases come along.

More Than Terminals

Computer Automation, Inc. believes DDP entails placing "substantial computing power" in terms of input medium at the point of action as opposed to just data entry with an intelligent terminal, according to Carsten Brydum, communications marketing coordinator.

While data capture and data entry are sufficient to justify a DDP system, remote divisions now want to do more with the massive capability a full-powered mini can give them, he said.

Jim Mezger, marketing manager for Data General Corp., said his was the classical minimaker's view. "That means we are selling effectively to organizations that have large centralized systems, but can't seem to get the computing power that is there to work for them."

Remote Users the Key

Noel O. Kile, vice-president of marketing for Qantel Corp., defined DDP as "allowing remote locations to handle their own processing and submit summary information to headquarters on a periodic basis."

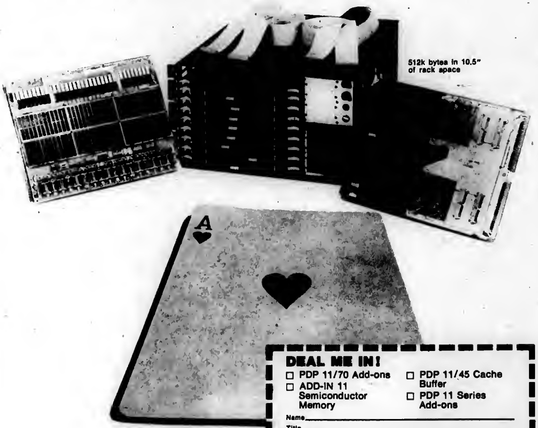
Remote users with minis rather than just terminals can have today's information today and headquarters can have the summary information it needs without excessive paper load, he said.

For Cummins-Allison Corp., DDP means "the processing of information in the most efficient and economical manner by the people or departments who need access to that information," according to William J. Hautigan, sales promotion manager.

Fabri-Tek has an ace in the hole for PDP 11/70 users.

The Model 7011 Add-on Core Memory. Totally plug-compatible with the PDP 11/70. Compact expansions up to 2 megabytes in 128K byte increments. Improved performance with cycle time of 650 nanoseconds, access time 250. Parity checks and interleaving are standard features. Plus, of course, the reliability of non-volatile core. With our prices and 30-day delivery, you can't afford not to get in the game.

Fabri-Tek is the only independent to cover the entire DEC PDP 11 Series with both core add-ons and semiconductor add-ins. Whatever your requirement, we'll deal you a winning hand.



512k bytes in 10.5" of rack space

When it comes to memory expansion, we've stacked the DEC.

DEAL ME IN!

☐ PDP 11/70 Add-ons
☐ ADD-IN 11 Semiconductor Memory
☐ PDP 11/45 Cache Buffer
☐ PDP 11 Series Add-ons

Name__________
Title__________
Company__________
Address__________
City_____ State_____ Zip_____ Phone_____

FABRI-TEK INC.
COMPUTER SYSTEMS
5901 South County Road 18
Minneapolis, MN 55436 • (612) 935-8811

PDP-11, Nova, and Eclipse Users

Call (617) 272-8140 or write *TODAY* to find out about the best price/performance packages available for disk and communications.

☐ DEC RK-11 Replacement ..... *save 40%!*
☐ DG 4046 Replacement ..... *save 40%!*
☐ DG 4234 Replacement ..... *under $3000!*
☐ CDC Storage Module Controllers for PDP-11 and Nova .... *save over 50%!*
☐ PDP-11 Communications MPX ...... *only $140/channel!*

With features designed for the systems user, at prices structured to fit your budget.

Xylogics

42 Third Avenue
Burlington, Mass. 01803
Tel (617) 272-8140
TWX (710) 332-0262

Please fold along guideline and seal envelope securely before mailing

Fold and insert order form (attached through binding) and remittance here.

USE THE ATTACHED ORDER FORM AND THIS ENVELOPE FOR:

- ☐ *a new subscription*
- ☐ *new address*
- ☐ *new title*
- ☐ *new industry*

Order form is attached through binding. Be sure to include current label or label information when making a change

first class
permit no 40760
newton ma

no postage stamp necessary if mailed in the United States

COMPUTERWORLD

797 Washington Street
Newton MA 02160

CW Photo by M. Upton

Pigskin Processing

WESTBOROUGH, Mass. – Data General Corp. (DG) took to the air to defeat rival Interdata in the third annual Databowl flag football game between tha two firms recently.

DG was ahead from the start; the final score was 38-6. Interdata fought back in the second half and held DG to only one touchdown. Taking a page from DG's book, Interdata passed for a touchdown in the last half.

Interdata spectators, who bused np from New Jersey, outnumbered the tiny contingent from nearby DG. However, on the field, DG had at least two good passers and a galloping receiver with "great hands." The combination proved unbeatable. The Interdata team had not played before the gama, although it had held some scrimmages.

Interdata Captain Dick Vivian acknowledged DG's prowess on the field and mnttered, "Wait until next year."

With One-Stop Shopping

Shift Seen in Distribution of Terminals

BRIDGEPORT, Conn. – There is evidence the terminal industry is on the verge of a shift in distribution which can have enormous implications for the consumer, 'according to Joseph Sorrentino.

Small computer manufacturers and computing equipment users who want to purchase nationally known products and have them serviced under one contract are creating a new echelon in the distribution process, the president of Computer Peripheral Corp. (CPC) said.

This echelon is being served by one-stop terminal "supermarkets" that offer national distribution on a variety of brands and the ability to provide nearby service when equipment goes down, he explained.

CPC is such a company, offering three major lines of CRT terminals including those from Lear Siegler, Beehive and Hazeltine along with Okidata and MI^2 printers.

There is a growing number of companies like CPC "which are moving the manufacturer one echelon back in the distribution process so they are becoming the providers for the system, rather than functioning in their traditional role as its master," Sorrentino said.

"The need to know more about a business – and quickly – is creating increasing requirements for access to company computers at all levels, albeit with widely differing information needs.

"These applications variations are producing the expanding need in the marketplace for the multibrand showcase of terminals and equipment to meet the specific requirements of the application. This is where the supermarket-type terminal distributor is serving and thriving," Sorrentino said.

He believes his company's early success stems from being able to provide "the right terminal for the customer's application, when he wants it, and being able to be there with immediate service when a terminal has trouble.

"Substantial savings are achieved in negotiating only one service contract instead of a half dozen," Sorrentino said.

Evaluation Task

Sorrentino said it has been his experience that customers also like the way such distributors stay on top of developments in the terminal field and evaluate new products for their possible application.

"This," he explained, "is because terminal users are limited by the amount of time they can spend on keeping abreast of advancements. Companies like ours have to do it regularly – it's the way we stay in business – and the customer benefits through time saved and quicker introductions of innovations to their particular business needs."

Less than a year old, CPC has already expanded into 19 metropolitan markets.

"We're growing and moving rapidly because we feel we're blazing a trail with a few other companies. Soon there will be many more entering this field who will run close on our heels," Sorrentino said.

Seeing where you've been can show you where you're going.

Read the *Year-End Review and Forecast* in the combined December 27th/January 3rd issue of *Computerworld*.

As the once-in-a-lifetime U.S. Bicentennial approaches its demise, it's time to sit back and look beneath the headlines for the truly significant events of 1976. Beyond those tall ships, giant cakes and candidates, what really happened to shape and direct this historic year? If you're involved with computers, you'll find answers that affect you in *Computerworld's* Year-End Review and Forecast, appearing in the special, combined issue of December 27/January 3.

Edited by E. Drake Lundell, this special issue will be filled with useful analysis and insightful commentary on the year's most compelling computer stories. To name just a few items, this report will cover the latest developments in computer hardware, software and communications; the effect that recent (and pending) legal decisions and/or federal policy revisions may have on the industry as a whole; and the way computers are changing our society. In addition, a variety of experts will be on hand to help shake the dust from *Computerworld's* crystal ball, and give you knowledgable forecasts of important events that are likely to occur in 1977. It's all coming your way December 27th -- and if you're involved with computers, you'll find articles, newsnotes, commentary and summary that will interest and inform you.

And if you're marketing products or services to the people who use computers, your ad should be a part of this unique special issue. Contact your *Computerworld* salesman for complete details. Or call Judy Milford at (617) 965-5800 to place your ad, and start a beautiful 1977.

COMPUTERWORLD

Boston
Bob Ziegel
Mike Burman
(617) 965-5800

New York
Don Fagan
Frank Gallo
(201) 461-2575

San Francisco
Bill Healey
Jim Richardson
(415) 495-0990

Los Angeles
Bill Healey
Jim Richardson
(213) 477-3535

Executive Corner

- Dause L. Bibby has been elected chairman of the board of directors of Decision Data Computer Corp.
- Dr. William C. Leone, Thomas J. Klutznick and Harry G. Bowles have agreed to join the Datapoint Corp. board of directors.
- Donald L. Eichler has been named to the board of directors of On-Line Business Systems, Inc.
- Edward G. Uhl has been elected chairman of the board and chief executive officer and John F. Dealy has been elected president and chief operating officer of Fairchild Industries, Inc.
- Jerome Drexler and Robert Hallock have been elected to the board of directors of Precision Monolithics, Inc.
- Arthur R. Garofalo has been appointed president and general manager of MCS Infodevices, Inc.
- D.K. Ritchie has become president of ESE Electronic Systems, Inc.
- Darryl J. Dillenback has been promoted to vice-president of manufacturing for Magnetic Windings Co.

POSITION ANNOUNCEMENTS

Internetional Corp. consolidating their data center in Houston seeks the following:

EDP Audit Mgr.	$25M
3 EDP Auditors	$20M
Project Mgr.	$23M

20 ANALYST & PROGRAMMERS with salerias $14 to 20M. This Co. is installing 370/168 IMS, TSO, MVS systems. This Co. offars tha best in benafits & futura growth potential. This is e rare oppor. to join e very progressive firm.

EDP SEARCH
2401 NW 39th Okla. City, Ok.
(405) 525-5533

PROGRAMMER ANALYSTS

CONNECTICUT-WESTCHESTER

Vary successful consulting firm urgently seeks talantad, flaxible p/a's to work with mejor client companias and banks. High visibility, fast track, no overnight traval. Must hava 2 yrs + COBOL, IBM or Honeywell, broad variaty in applications axperience. Salary $12-18,000 depanding on background. Other openings for p/e's with mini femiliarity. Fee paid, of course.

Dunhill
OF GREATER STAMFORD
500 Summer Street
Stamford, Ct. 06901
(203) 357-5288

Faculty Position: Department of Physics and Computer Science, Murray State University. Ph.D. in Computer Sciance or relatad field raquired. Taeching and industrial experience desirable. Tha successful candidata will be axpected to supply theoritical support to en applied computer science program. Rank and salery dependent upon qualifications. Send application including resume, three raferances, undergradudate and graduata transcripts to Dr. Robert C. Etherton, Chairman, Department of Physcis and Computar Science, Box 2109 University Station, Murrey Stata University, Murrey, KY 42071. Applications racelved aftar January 15, 1977, may not be considerad.

Equal Opportunity Employer M/F

ASSISTANT PROFESSOR OF BIOLOGICAL CHEMISTRY AND DIRECTOR OF RESEARCH COMPUTER FACILITY.

Responsibility for operation and further devalopmant of Research Computar Facility serving multiple users; opportunity to develop new programs; graduata laval teaching. Ph.D. with relavant axperienca raquired. Position open Januery 1, 1977. Send resume and two lettars of recommandation to Dr. Eugena A. Davidson, Dept. of Biological Chemistry, The Milton S. Hershey Madical Center, The Pennsylvania Stata University, Hershay, PA 17033 USA

An Equal Opportunity Employer

SENIOR PROGRAMMER ANALYST

Major manufacturer of electrical control devices looking for a data processing professional who has a minimum of 4 years manufacturing experience. Candidates should have an understanding of manufacturing systems including B/M Processor, M.R.P., C.R.P., S.F.C., COBOL, T/P and P.I.C. user experience a plus. Send resume and salary history to Employee Relations Manager, 2901 Industrial Drive, P.O. Box 1158, Bowling Green, KY 42101, (502) 842-6511.

An Equal Opportunity Employer M/F

PROGRAMMER/ ANALYST

General Cable Corporation. . .with a modern facility in suburban Denver. . .is a well-established, stable and continuously expanding leader in the design and manufacture of mobile utility equipment.

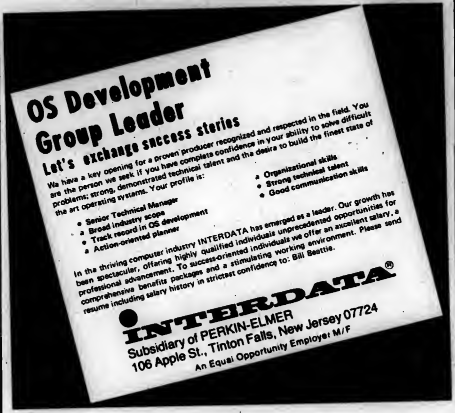
We're currently expanding our data processing department and need an experienced programmer/analyst. You should have two years of experience in a manufacturing environment. You'll need BOMP and RPGII experience. An Associate degree is preferred, and MRP experience will be a plus.

You should have proven ability to organize and implement analysis and programming tasks with maximum efficiency. You'll work closely with all the departments in our facility.

We offer excellent company paid benefits, modern working conditions, and a competitive starting salary. To apply, please send your resume to: Personnel Manager, General Cable Corporation, 5600 W. 88th Ave., Westminster, Colo. 80030.

GENERAL CABLE CORP.

Equal Opportunity employer



OS Development Group Leader

Let's exchange success stories

We have a key opening for a proven producer recognized and respected in the field. You are the person we seek if you have complete confidence in your ability to solve difficult problems; strong, demonstrated technical talent and the desire to build the finest state of the art operating systems. Your profile is:

- Senior Technical Manager
- Broad industry scope
- Track record in OS development
- Action-oriented planner
- Organizational skills
- Strong technical talent
- Good communication skills

In the thriving computer industry INTERDATA has emerged as a leader. Our growth has been spectacular, offering highly qualified individuals unprecedented opportunities for professional advancement. To success-oriented individuals we offer an excellent salary, a comprehensive benefits packages and a stimulating working environment. Please send resume including salary history in strictest confidence to: Bill Beattie.

INTERDATA®

Subsidiary of PERKIN-ELMER
106 Apple St., Tinton Falls, New Jersey 07724

An Equal Opportunity Employer M/F

DATA PROCESSING

If you are interested in relocating to the beautiful Pacific Northwest, we currently have several excellent positions for EDP professionals with banking experience. The following represent a small sampling of current opportunities.

V.P. - EDP Manager	to 40K
Systems Analysts	to 25K
Analyst Programmers	to 22K
Programmers	to 20K

Contact Jim Morris or Bill Parfitt, Houser, Martin, Morris and Associates, 1621 114th S.E., Suite 219, Bellevue, WA 98004, (206) 455-9600.

UNIVERSITY POSITION

PRODUCTION SERVICES MANAGER

Responsibilities include planning, organizing and directing the day-to-day production activities of a major University Computation Center.

Among the REQUIRED QUALIFICATIONS for this position are:

1. Ability to establish and maintain effective relationships with employees;
2. Experience operating and/or managing a large-scale computer system.

DESIRED QUALIFICATIONS include:

Undergraduate degree or equivalent training and experience.

Salary range is
$16,000-$19,000 per annum

RESUME to John K. Seitz, University of Kansas Computation Center, P.O. Drawer 2007, Lawrence, Kansas 66045, on or before December 1, 1976.

THE COMPUTATION CENTER IS AN EQUAL OPPORTUNITY EMPLOYER. QUALIFIED MEN AND WOMEN OF ALL RACES ARE ENCOURAGED TO APPLY.

COMPUTER CORPORATION OF AMERICA

We're doing exciting things at CCA! We're developing technology for ultra-large data base systems with state-of-the-art mass memory concepts; we have the most advanced data base management product on the market; we're working on distributed data base management technology for nationwide computer networks - and much, much more. If you have been seeking a dynamic environment and more challenge in a growing company, consider the positions we have immediately available.

COMPUTER SCIENTIST

To manage our distributed data base research and development effort and to conceptualize new approaches and techniques. Established expertise in data base management technology is required. A PhD in Computer Science is strongly preferred.

NATIONAL SALES MANAGER

To direct and coordinate software product sales, customer technical support, and marketing support; and to hire, train and manage a geographically dispersed sales staff. Experience in DBMS sales, supervision and training of a sales staff, and knowledge of data base management are strongly preferred.

SYSTEMS PROGRAMMER (PDP-10)

To maintain a TENEX system and to install a large, complex applications system on additional TENEX and TOPS–20 sites. The position requires three or more years systems programming experience, and a knowledge of TENEX and/or TOPS–20 is strongly preferred.

SYSTEMS PROGRAMMER (PDP-11)

To assume full responsibility for the design and implementation of a unique communications interface system. The position will provide significant opportunities for advancement. We are seeking an enthusiastic person who has PDP–11 systems programming experience and a telecommunications background.

Please send resume, including salary requirement, to
Lynn Moulton, Personnel Director

Computer Corporation of America
575 Technology Square
Cambridge, Mass. 02139

An Equal Opportunity Employer M/F

PROFESSIONALS

University Medical Center known for progressive ideas in the health care industry is seeking growth oriented professionals for the following positions:

1. DIGITAL ELECTRONIC ENGINEER-will be involved with design and development of digital circuitry for advance medical application. MS degree or equivalent experience.
2. PROGRAMMER-To work micro-processor PDP-11, assembly language knowledge desirable BS, MS or equivalent.

We offer excellent starting salaries commensurate with experience. With one of the finest benefit programs around, including 4 weeks paid vacation after the first year.

Send complete resume to:

**Phil Olsen
Rush Presbyterian-
St. Luke's Medical Center
1725 West Harrison Rm 346
Chicago, Illinois 60612**

UNIVERSITY OF PETROLEUM & MINERALS DHAHRAN, SAUDI ARABIA

The Department of Systems Engineering, University of Petroleum and Minerals, Dhahran, Saudi Arabia, will have faculty positions open for the Academic Year 1977-78, starting 1 September 1977. Candidates with PhD degrees preferably with teaching experience are invited to submit their applications. English used for instruction.

Minimum regular contract for two years, renewable. Competitive salaries and allowances, free air conditioned and furnished housing, free air transportation to and from Dhahran each two year tour. Attractive educational assistance grants for schoolage dependent children. Local transportation allowance in cash each month. All earned income without Saudi taxes. Ten-month duty each year with two-month vacation paid and possibility of participating in University's ongoing Summer Programs with adequate additional compensation.

Apply with compete resume on academic and professional background, list of references, publications and research details, and with copies of degrees/testimonials, including personal data, such as, home and office addresses, telephone numbers, family status (names of children, age and sex) to:

**University of
Petroleum & Minerals
c/o Saudi Arabian
Educational Mission
2223 W. Loop South, Suite 400
Houston, Texas 77027**

NCR's newest facility, the Data Processing Division in Wichita, offers growth opportunities for ambitious individuals to work on state-of-the-art, next generation, small business computer systems and associated equipment. Wichita's cost of living is up to 30% less than most major eastern cities. Wichita's air is among the cleanest...school systems are among the finest in the country. We welcome an opportunity to discuss employment with you!

SENIOR DATA BASE MANAGEMENT ENGINEER

Minimum of 5 years experience in implementation of a data base management, operating or communications system. High degree of visibility within the organization reporting to the Advanced Development Manager.

SYSTEMS SOFTWARE PROGRAMMERS

- Communications
- File Management
- Minicomputer Operating Systems
- Firmware Development
- Diagnostic Systems Designers
- Compiler Designers
- Assembly Level Programmers

SYSTEMS HARDWARE DESIGN

- Real-time Architectures and Development with experience with on-line minicomputer applications.
- Network Design and Communications Control for Distributed Processing Systems.
- Minicomputer Hardware/Software Design Trade-off.
- Terminal and Peripheral Interface Design.

NETWORK DESIGN

- Node Control
- Distributed File Management
- Terminal Handling
- Computer Communications

SEMICONDUCTOR COMPONENT ENGINEER

3 to 5 years experience with emphasis in:

- Evaluation and Specification of Semiconductor Components
- Discrete, Digital and Linear IC's

DESIGN AUTOMATION ENGINEER

- BSEE degree with minimum of 3 to 5 years experience.
- Familiar with Fortran, Logic Simulation, Systems Simulation, P.C. Board Design, and Automated Bill of Materials.

COMMUNICATIONS SYSTEMS ENGINEERS

A degree in engineering, computer science or equivalent is required with preference being an advanced degree. An EBA would be a substantial asset. Applicant must have strong systems orientation and substantial experience with communication systems. In-depth knowledge in one or more of the following areas are desired:

- Operating System Provisions toward communication, including communication access methods.
- Communication processor architecture.
- Communication link disciplines.
- Communication systems diagnostics.

Send resume including salary history to: Max Anderson, Professional Placement, Dept. CN, 3718 N. Rock Road, Wichita, Kansas 67226.

An Equal Opportunity Employer

NCR

Data Processing Division — Wichita

Systems Analysts

STATE-OF-THE-ART

San Francisco

These positions require advisory level experience, comprehensive systems design and implementation, user sensitivity, and a high caliber of professionalism.

You will work in 370/168, MVS, IMS, DL-1, COBOL, on-line environment on financial applications.

In return for your contribution other factors include: excellent career development, extremely attractive fringe benefits (including interview and relocation expenses paid), and a salary to $25,000.

LOGICAL OPTIONS INC.

233 SANSOME ST 'SUITE 1300
SAN FRANCISCO, CAL. 94104
415/781-0844

An Employer Paid Personnel Service

FLORIDA POSITIONS

Systems Analyst-Hardware/Software PDP 11 Distribution systams -	$26K
Diagnostic Programming Supervisor PDP 11, Systems test -	$23K
Programmers, PDP 11 Assembly -	$16K
Project Leaders, PDP 11, Assembly -	$23K
Project Manager, Senior Analysts, Programmers for Banking applications, large scale CICS, CPCS, 370-OS & DOS to	$22K
Manager Systems & Programming 370/155 OS to	$30K
Project Leaders, Programmers 370, OS, IMS Financial background to	$22K

Many positions too numerous to list. Our client companies offer package paid, excellent environment and challenging career opportunities. Submit resumes in confidence stating salary requirements to:

PAUL RILEY V.P.
DATA SCIENCES
PERSONNEL, INC.
15490 N.W. 7 Ave.
Miami, Fla. 33169
(305) 555-7591

INTERNAL AUDITOR EDP

Able to Evaluate Adequacy of Controls Within Computer Systems

Responsibilities will be in the areas of evaluating policies, procedures, and systems design as they affect the security and reliability of controls built in to provide proper protection against error, interference, or abuses.

Evaluations will be performed routinely with respect to any change or addition in accounting or information systems, and audits will be done periodically or in response to specific problems. Utilize broad knowledge of EDP systems and auditing techniques to perform assignments without close supervision.

At least 5 years experience in computer systems or 3 directly in computer-based systems auditing is required, with degree in Business Administration or Computer Science. Previous audit function background in EDP systems is highly desirable.

Please send resume in confidence, indicating salary record, to:

EMPLOYMENT MANAGER
PIZZA HUT, INC.
P.O. Box 428
Wichita, KS 67502
An Equal Opportunity Employer M/F

APPLICATIONS PROGRAMMER/ ANALYST

A rapidly growing, well established data center in Florida with dual processor B-6700 on-line environment with multistate terminal network seeking individuals with strong financial applications background. Must have minimum two years experience in COBOL with S&L or commercial bank experience on medium/large scale system.

Send resume to D.R. Thrush, Personnel Manager, P.O. Box 1547, Orlando, FL 32802. *Equal Opportunity Employer*

DATA BASE PROGRAMMERS

Wa are a leading computer software company in an attractive Texas location with immediate openings for systems programmers who have the interest, talent, and experience required to design and implement a large-scale comprehensive data base management system.

Significant IBM, Honeywell, or mini-computer systems programming experience is important.

If you would like the unique opportunity to contribute to state-of-the-art software development with other highly-motivated professionals, please send us your resume today.

MRI SYSTEMS CORPORATION

P.O. Box 9968
Austin, Texas 78766
An Equal Opportunity Employer

---

manager systems/ computer services

A manager is being sought with demonstrated management ability and successful experience in management of a major Systems and Computer Services Department. Experience must include: supervision of data processing and systems personnel; management of major projects; budgeting and utilization of resources. Familiarity is highly desirable with IBM 370-145 DOS/VS utilizing DL-1 and CICS and interfacing of mini computers with this system. Reporting at the Vice Presidential level, salary will be commensurete with level of responsibility assumed.

Our Company is an investor owned combination utility (electric-natural gas-water) headquartered in Spokane (population 170,000) serving 26,000 square miles in northeastern Washington and northern Idaho. The successful 'results oriented' candidate selected will experience the ultimate opportunity for challenging work within an ideal living environment. Interested applicants should submit a description of major project responsibilities, confidential resume and salary history to: Ted Hamilton APS, Employment Representative, P.O. Box 3727, Spokane, WA 99220.

The Washington Water Power Co.

an equal opportunity employer

If You're Open To New Techniques and Ideas-

You Should Be At Digital-Marlboro

We're the Software Support Group for the large computer systems – DECsystem-10 and DECsystem-20 and networks. We pride ourselves in being a rapidly growing, technically-integrated group that has earned the respect of our entire corporation.

If you appreciate working in an exciting and innovative atmosphere, then you should investigate Digital-Marlboro.

Software Product Services Analyst

In this high-visibility position, you'll be a major contributor to the internal planning of our systems software, primarily DECsystem-10, Decsystem-20 and networks. You should be an independent, assured professional, able to take an idea or set of product data and create support requirements, marketing projections, financial considerations, training needs and manpower capability requirements. Since you'll be expected to communicata with various levels of management, good interpersonal skills are essential.

A very strong Planning background is a must for this analytical assignment, as is solid technical/computer experience. To meet the challenges of this position, you should be a well-seasoned veteran with at least 4 years experience in technical support planning, also including marketing concepts, and be willing to accept considerable responsibility.

This is an excellent opportunity to become an integral part of our rapidly growing Softwere Services Group.

Software Product Support Specialists

We currently have several excellent opportunities available for technical skilled Software Support professionals in the areas of:

- Communications & Networks
- Commercial products & applications
- Scientific languages
- User applications

You'll be supporting our DECsystem-10, Decsystem-20 and networks field specialists worldwide, primarily solving customer problems either at our Marlboro facility or on site. In addition, you'll interfaca with users, technical, marketing, and development personnel and, supported by our highly respected Software Services Group, will solva user problems based on technical requirements. If you appreciate a real technical challenge and are growth and result-oriented, this is the position you've been waiting for!

To qualify, you should have at least 3 years experience in operating and maintaining large systems, preferably the DECsystem-10, DECsystem-20 and natworks. Excellent interpersonal skills, leadership ability and solid technical knowledge are also assential. Some travel will be required; fluency in a second language helpful, but mot mandatory.

For an appointment, forward resume outlining salary requirements and indicating position desired to Douglas H. D'Agata, Digital Equipment Corporation, 200 Forest St., Marlboro, Mass. 01752.

digital

digital equipment corporation

Programmer/Analyst

Join GenRad's M.I.S. Department. Our computer is an IBM 370/145 with VS-1 running IMS/VS, DB/DC. Apply now for this career opportunity at our Concord facility just off of Route 2.

You will be involved in all phases of applications programming concepts and practices plus will participate in systems design with others. You will plan the interaction of complex program modules and write the related job control language to the OS environment. Manufacturing and/or financial background with IMS experience is desirable. PL/1 or COBOL experience is required. A minimum of three years experience in programming to qualify.

GenRad, an international corporation, produces high quality instrumentation and systems for industry. Many potentials for recognition and advancement, plus an excellent benefits package, are offered with this career opportunity.

Please send your resume in confidence to our Personnel Department at 300 Baker Avenue, Concord, Mass. 01742.

An equal opportunity employer M/F

GenRad

Computer/Communications
Software Professionals

HELP US BUILD THE WORLD'S LARGEST APL TIME SHARING SYSTEM

Scientific Time Sharing Corporation introduced Interactive APL time sharing to the business community in 1969. We have been the pacesetter ever since, and our continued leadership is verified by an exceptional growth record. Now we're on the threshold of a bold new era of dynamic expansion.

We have purchased and installed an Amdahl 470 V/6 to meet growth requirements generated by new customers and exciting new applications of our APL*PLUS® Time Sharing Service. More big things are coming, and we need your help to make them happen. To carry out our plans to make APL* PLUS Service even more useful and powerful, we are seeking nine software professionals. More specifically, we're looking for:

- **Manager of Systems Software**
- **Manager of Communications Software**
- **Senior Systems Programmers**
- **Systems Programmers**
- **Communications Software Programmer**

Requirements range from 3 to 8 years of operating systems software experience (MVT/SVS/MVS) and communications software experience (IBM 3705, front end processors). APL systems and internals experience is highly desirable. Experience with time sharing systems and hardware performance measurement would also be very helpful.

You will be based at our headquarters in Bethesda, Maryland, a superior residential suburb of Washington, D.C. Our working environment is extremely creative. You will enjoy our kind of disciplined informality that breeds results and keeps stimulating you to greater achievement.

Let's talk. Local interviews can be arranged. Send your resume and salary requirements in confidence to: Jonathan D. Lazarus, Director of Systems Development.

Scientific
Time Sharing
Corporation

7316 Wisconsin Avenue, Bethesda, Md. 20014
An Affirmative Action, Equal Opportunity Employer M/F.

Coordinator
Academic Computing Services

Duties: Assist faculty and students in computer usage for instruction and research; develop software for academic use; prepare documentation of academic computing services; supervise student workers.

Qualifications: MS in Computer Science or related field; knowledge of several programming languages; experience with statistical packages; familiarity with time-sharing systems; ability and desire to work with students and faculty.

Send resume with salary requirements by November 30, to:

Personnel Office
Southeast Missouri State University
Cape Girardeau, MO 63701

An Equal Employment Opportunity/ Affirmative Action Employer

Life Insurance/ Software

JACK EDWARDS has held positions in the life insurance industry from Programmer to Director of Data Processing and Sr. Systems Consultant. Contact Jack for a personal, confidential discussion of todays best opportunities. No obligation, let's just talk about your career.

If you have experience in:

- COBOL or BAL Programming
- Life Insurance Daily Cycle
- DOS/OS JCL
- Agency or Accounting Systems
- Actuarial applications
- Pensions
- Investments/Financial Applications
- Project Management
- CFO, Life/70, LIFE-COMM, ALIS

I'd like to hear from you. Introducing quality people to quality companies is my business. Several locations. Call or write today.

RANDOLPH (JACK) EDWARDS
F.L.M.I.
DATA PROCESSING CAREERS,

7715 Chevy Chase Dr., Suite 125
Austin, Texas 78752
(512) 452-0871
Personnel Consultant

Programmer/ Analyst

Manufacturing Company located in Northwest Arkansas is looking for a programmer/analyst who would like to become involved with Manufacturing systems. (MRP, Shop Floor Control, etc.). Should have 1-1/2 to 2 years programming in RPG II. Send salary requirements and resume to:

Personnel Department
Shakespeare of Arkansas
P.O. Box C
Fayetteville, Arkansas 72701

Faculty Position: Department of Physics and Computer Science, Murray State University. Ph.D. in Electrical Engineering or related field required. Teaching and industrial experience desirable. The successful candidate will be expected to establish an undergraduate micro-processor and mini-computer laboratory. Rank and salary dependant on qualifications and experience. Send application including resume, three references, undergraduate and graduate transcripts to: Dr. Robert C. Etherton, Chairman, Department of Physics and Computer Science, Box 2109 University Station, Murray State University, Murray, KY 42071. Applications received after February 15, 1977, may not be considered. *EOE M/F*

MANAGER TECHNICAL DEVELOPMENT

Rapidly expanding international firm has an immediate opening for a person with 6-8 years experience in design and implementation of complex systems and an in-depth knowledge of systems design, operating systems technique and related hardware (370/158). SVS experience preferred, MVS experience helpful. Degree in a field related to information processing preferred. Salary 22-28K. Please send resume and salary history to:

CW Box 4828
797 Washington St.
Newton, Mass. 02160

Senior Technical Specialist

This is your opportunity to get in on the ground floor of Digital's expanding LSI Development Program. In this wide-ranging position, you will provide technical support, mainly in the area of Software, to our LSI-11 sales specialists. Your responsibilities will include sales training, developing sales aids, delivering seminars, and giving application-oriented software consultation. Some travel will be necessary, as you'll be interfacing regularly with Engineering, Sales, and users.

You must have a good general knowledge of small systems software, and either Software Applications or real-time experience. A Bachelor's degree in Mathematics, Computer Science, or equivalent, is required. A knowledge of PDP-11 software, particularly RT-11 and RSX-11, plus FOCAL, BASIC, and/or FORTRAN are desirable.

Forward resume outlining salary requirements to Douglas J. D'Agata, Digital Equipment Corporation, 200 Forest St., Marlboro, Mass. 01752.

digital
digital equipment corporation

an equal opportunity employer m/f

Data Processing

Exceptional Opportunities In
SYSTEMS

We are a large 700 bed teaching hospital with an active and growing Computer Systems Division. This position has both immediate and long term expansion goals encompassing the immediate development of a new major system and a total system planning effort within administrative and medical areas.

The following opportunities offer excellent salaries and benefit packages along with the unique opportunity to innovate and grow with us. All replies will be held in confidence.

Director
Systems Development Section

Responsibilities include the overall management and development of this section along with planning new computer applications with various in-house divisions.

Requirements include a college degree, 6 years of experience encompassing the management of large, complex systems development projects and excellent written and oral communication skills.

SYSTEMS ANALYST

Your responsibilities in this important growth position include the defining, designing, and implementing new systems. In accomplishing these functions, you will report to and work closely with a senior systems analyst.

Requirements are 3 years of systems analyst and programming experience with a thorough knowledge of PDP-11 Computers, R.S.T.S. operating system and basic plus programming language. For this position a college degree and familiarity with health care systems is desirable.

PROGRAMMERS

You will be an important part of a professional team and work with systems analysts in developing and implementing new systems.

Requirements for this excellent growth opportunity include a minimum of one year of programming experience, minicomputer experience, some knowledge of PDP-11 Computers, R.S.T.S. operating systems and basic plus programming language.

Submit all resumes to Diane C. Lavine
Director of Employment

LUTHERAN GENERAL HOSPITAL

1775 Dempster St., Park Ridge, Ill. 60068
An Equal Opportunity Employer M/F

The smart move is to Honeywell

Honeywell Level 6 Minicomputers

Our new family of minicomputers are an unqualified success. This kind of acceptance means unsurpassed opportunities for experienced minicomputer professionals. That's why, if you are really out to advance your career, the smart move is to to Honeywell.

sales engineers

We're offering outstanding Sales Engineers unique opportunities to sell advanced Level 6 minicomputers with big company support. We're looking for experienced minicomputer Sales Engineers, with a BS in Engineering or its equivalent, and 3-5 years selling to OEM's, System Builders and large end users. You'll become part of a dynamic sales organization and receive an excellent salary and benefits, commissions and the the chance to grow rapidly.

systems analysts

The Level 6 minicomputer family brings outstanding opportunities to Systems Analysts. If you have 5-10 years sales support experience with minicomputers, a knowledge of assembly language, compilers and operating systems, it's an opportunity you'll want to thoroughly explore. With Level 6, we're on our way with all the signals ahead looking good.

Immediate openings in Chicago, Los Angeles, San Francisco, New York City Area, Washington, DC, Cleveland, Atlanta, Dallas, Boston, Philadelphia and other large cities.

For an immediate reply, please forward your resume to:
Kevin A. Keane, Honeywell Information Systems, Inc.,
M/S 425, 200 Smith St., Waltham, MA 02154.
An Equal Opportunity Employer

Honeywell

NCR

SPECIAL SYSTEMS DIVISION

New Positions in San Diego

The Special Systems Division of NCR located in San Diego, is involved in the development of on-line banking and retail systems. Current and future business commitments require that we add several systems analysts in the following categories:

Communications Software Development

These positions entail the system design and development of software for large communications networks. Experience at all levels in assembly language and a mini-computer background is necessary. Experience in telecommunications, software and a related BS degree is preferred.

Software Support

Requires persons skilled in assembly language, with a sound background in mini-computers to perform maintenance and field support of telecommunications networks. A number of these positions provide the opportunity for substantial travel and customer contact.

Computer Systems Simulation

A position exists for a person with a minimum of two years' experience to perform simulation of computer systems and compiler performance measurement. This position requires knowledge of statistics and queuing theory and programming experience in languages such as Fortran, GPSS or Simscript. A related degree is preferred.

Please submit resume including salary history to Bruce Bertsch, Manager, Industrial Relations.

NCR

Special Systems Division
4045 Sorrento Valley Blvd.
San Diego, Calif. 92121

ANALYSIS/ PROGRAMMER

An Equal Opportunity Employer

A fast growing unit of local government that is home to the University of North Carolina (at Chapel Hill) is organizing a data processing department. We are looking for someone with experience to head this agency. Prior government employment would be helpful but is not necessary. The salary is not fixed but will be commensurate with applicant's experience. A generous fringe benefit package is provided.

Contact: S.M. Gattis
Orange County Manager
106 E. Margaret Lane
Hillsborough, N.C. 27278
(919) 732-8181

BURROUGHS 6700 SOFTWARE SPECIALIST

A national consulting firm located in suburban Chicago and specializing in finance/personnel related matters is in the process of converting their present Burroughs 4700 system to the 6700.

We are seeking an individual who has:

- Significant experience in Burroughs 6700 system software.
- Detailed knowledge of the 6700 operating system, utility programs and programming languages (APL, ALGOL, FORTRAN, with an emphasis on COBOL).
- A working knowledge of the Burroughs 4700.
- Some conversion experience is highly desirable.

Compensation is highly competitive. This is an excellent opportunity for an individual with the requisite interpersonal skills and intellectual capabilities to join our consulting staff upon completion of the conversion.

For immediate consideration please send a detailed resume to include salary history, in confidence to:

CW Box 4624
797 Washington St.
Newton, Mass. 02160
An Equal Opportunity Employer M/F

Research and Development Opportunities

Due to Digital Equipment Corporation's steady growth our R&D Group has a continuing need for outstanding people. Ideal candidates will have doctorates in Computer Science (or equivalent theoretical background) and demonstrated practical achievements in their specialties. Such accomplishments as books authored, patents, etc., are pluses. Applicants should enjoy blending research, advanced development, and internal consulting in a stimulating informal atmosphere where the fruits of ideas have visible impact.

Current openings include the following:

Multiprocessed Microprocessor Researcher

Expertise in both software and hardware is required for investigating the potential value of constructing computer systems by connecting some number of simpler computers.

Applications Programming Researcher

Exploring the possibilities of generating and/or customizing application software packages automatically, your goal will be to find less labor-intensive ways to do applications programming.

Operating Systems Researcher

You will research and consult across the full spectrum of operating systems topics. Both a broad knowledge of the state-of-the-art and creativity in generating original ideas are required. Expertise in protection/security/privacy issues would be a plus, but other specialties are also welcome.

Performance Evaluation Researcher

Working closely with software engineering and marketing, you will be responsible for simulation modeling and performance measurement of interactive computer systems, with initial emphasis on DECsystem-20. The primary goals are a better understanding of systems behavior and quantitative information on the performance of current systems.

Ideally, you will have knowledge of the DECsystem-20 or TENEX, research experience, and experience in simulation modeling are desired. Experience in mathematical modeling would be helpful.

Please address your resume outlining salary requirements to Justin Kelleher, Digital Equipment Corporation, Dept. B1122, 162 Main St., Maynard, Mass. 01754.

digital

digital equipment corporation

an equal opportunity employer m/f

DP MANAGER

Unusual Opportunity In Small-Scale Computer Field

A rapidly growing company in Fairfield County is seeking an individual to further develop a successful and viable portion of its business. The market is large and well identified with a clearly demonstrated need for our broad range of products. The acceptance of our overall product line has resulted in the company becoming the largest of its type in the country.

The most meaningful experience is a combination of management of a DP installation and direct selling experience of EDP peripheral equipment such as terminals, printers, minicomputers, or small-scale computer systems in the IBM environment.

We can provide the right individual with high rewards and long term stability.

Send a short letter describing your recent experience to the President, Box 608, Greenwich, Ct. 06830.

DATA PROCESSING AT

Amtrak

Amtrak's programs require the development of new systems to support FINANCIAL, OPERATIONAL, ENGINEERING, and RESERVATION functions of a nationwide corporation. We are adding senior and mid-level personnel who qualify for the following:

REAL TIME COMMUNICATIONS PROGRAMMERS
Requires on-line experience for systems development in Assembler language, maintenance, program testing, and the installation on CDC and PDP equipment.

PROGRAMMER & PROGRAMMER/ANALYST
Requires extensive experience in the design and implementation of applications in an IBM OS/MVT or VS environment using MARK IV, COBOL, FORTRAN. TSO, IMS, IBM 3790 programming helpful.

OPERATIONS PRODUCTION TECHNICAL SUPPORT
Requires extensive experience in IBM 360/370 OS, JCL, coding/debugging, production applications, abend analysis and resolution, OS/AMS utilities, operations documentation review and turnover, MVS background, hands-on experience in computer operations and a knowledge TSO and programming.

SYSTEMS PROGRAMMERS
Requires extensive experience in TSO to work on an IBM 370 MVS system.

We offer excellent salaries, benefits, and growth opportunities. Send resume including salary history in strict confidence to:

J.R. Brune, Personnel
AMTRAK
955 L'Enfant Plaza SW
Washington, D.C. 20024
An Equal Opportunity Employer M/F

SR. SALES ENGINEER

Northeast States

Don't overlook this exciting opportunity with Bourns, Inc., a worldwide leader in electronic components and data processing systems. Your responsibility will be to handle the sales engineering for our optical mark card readers in the northeastern U.S. These systems are currently being used for source data collection by a number of telephone companies and other industrial concerns.

Your qualifications should include 6 years experience in data entry systems sales to the end-user market, plus a background in peripheral and/or main frame.

If you can handle heavy responsibility, you'll be generously rewarded with an excellent salary, commissions and benefits package. For consideration, please rush your resume and salary history to:

BOURNS, INC.
Professional Employment Dept. CW-23
1200 Columbia Ave.
Riverside, Calif. 92507
Equal Opportunity Employer M/F

BOURNS

Education: Faculty Position.

Computer Systems Applications and Management Information Systems. Ph.D. required. Professional experience and interest in quantitative approaches to policy analysis desirable. Salary and rank negotiable.

Contact: Director,
Center for Technology
and Administration
The American University
Washington, D.C. 20016
An AA/EOE.

SYSTEMS MANAGER

New England financial client has immed need for expd indiv to direct short/long range DP plans to support trust operation. Salary ranges open D.O.E. Fee paid. Contact Stan Durbas (in confidence)

ROBERT HALF
PERSONNEL AGENCIES
111 Pearl Street
Hartford, Conn. 06103
(203) 278-7170

COMPUTER CENTER DIRECTOR
Continuing full-time Administrative & Professional position. Responsibilities of administration of Center; leadership in planning and coordination; direct staff; develop and administer annual budget. Master's degree in appropriate field, 5 years experience in computing at college and director level; Knowledge of third-generation systems. Zerox Sigma-series equipment experience desirable. Submit curriculum vitae by December 10, 1976 to James Powell, Provost, Oberlin College, Oberline, Ohio 44074. To be filled no later than July 1, 1977. Annual salary range $21,000 to $26,000. *Affirmative Action (M/F) Equal Opportunity Employer*

Systems Analysis - The University of Pittsburgh has positions available in scientific/technical and systems programming.
Systems Designer - Must have excellent background in COBOL, Mark IV, and data base management.
Systems Analyst - Design and maintain software packages for use by a technical and scientific user community.
Systems Analyst - Design and maintain operating system support software on a PDP system.

Send resume to:

James C. Chappars
G-26 Cathedral of Learning
University of Pittsburgh
Pittsburgh, Pa. 15260

BROADCASTING NETWORK CORPORATE HEADQUARTERS IN NYC DUPLEX 270/156 OS VM CICS IMS

BAL 13 to 17K
Must know IBM operating systems. Pure development project under CICS; they can train in CICS.

MARK IV to 20K
Senior prog/anal who they can also train in IMS and COBOL.

COBOL OS 12 to 20K
Work with financial and commercial systems under IMS.

Benefits, working conditions and the opportunities for promotion are far above the industry average. Contact Jon Kenneth, Mallory Data Systems Agency, 120 B'way, Suite 3114, NYC 10005 (212) 964-2060.

UNIVERSITY OF MASSACHUSETTS/AMHERST STAFF ASSOCIATE - DATA BASE ADMINISTRATOR MANAGEMENT SYSTEMS. Position available. Master's degree or equivalent professional experience and utilization of a data base management systems in an academic environment. Five years of experience in programming and at least one year in application systems design and analysis. Previous experience and knowledge of college or university administration. Ability to work well with people in varied organizational relationships. Resume by December 18, 1976 yo Bard F. White, Management Systems, Whitmore Building, 01003. The University is an Affirmative Action/Equal Opportunity Employer. 547B

$16,000 to $18,000
MINI
ANALYST

Expanding major oil Co. seeks person with 2-3 yrs. mini exper. Prefer DEC, HP, VARIAN, or Interdata hardware bkgd. You will be trained as a hard/software planning analyst. You would be one of the key figures in the future directions planning group. This Co. has 2) 370/158-JES-3, MVS, IMS & 21 mini-computers + 4) 360's & a Dual CDC 6800.

The BETTER WAY IS THE EDP WAY! MOVE TO THE GREAT SOUTHWEST!

EDP SEARCH (405) 525-8833
2401 NW 39th Okla. City, Ok.

MANUFACTURING

MRP BMP SFA MAPS MICS CRP

Top Corporations require EDP professionals with the following specific expr.

Sys. Mgr. Power Tools - MRP	$22K
Sys. Anal.-Rubber & Plastics Scheduling, Shipping, Inventory	$20K
Sr. Sys. Anal./Prog. Elect.-BOMP & MRP	$19K
Prog./Anal.(s) MRP - OS COBOL	$16-18K
Sr. Prog./Anal.-Elect. MRP, SFP, Sysgens	$17K
Sys. Anal.-Auto BOM, Eng. Specs. Inv. Control	$17K

Companies offer excellent benefits, in-house career progression, challenge and "State of the Art" installations. Coordinate your National/Regional search with one (1) recruiter. Complete confidence assured. All fees assumed by client companies.

FRANK PARKS — EDP DIVISION
EMPLOYERS PERSONNEL
320 Interstate North
Atlanta, GA 30339 (404) 435-3251

PROFESSIONAL COMPUTER SALES: THINK ABOUT UPGRADING YOUR POTENTIAL AND MAKE A MOVE.

TO AMDAHL:

BUILDER OF THE WORLD'S MOST EXCITING COMPUTER

Six years ago, a small group of leading designers of large computers—under the direction of a preeminent, pioneering computer scientist—set out to design and build a new generation of large computers.

Today, the Amdahl 470V/6 system is just that: a top-of-the-line, 3.8 to 5.2 million dollar computer that performs more work at lower cost than any other general purpose computer. It's unprecedented, and so is the company.

Within the past 18 months, this exceptional company has delivered 21 of these systems. Over $88,000,000 worth. But more to the point: 8 of the 21 were shipped during the third quarter of this year. Which is why we need help...from exceptional, enthusiastic individuals who need to perform well because the task is worth it, and because it's fun. We made a commitment to that philosophy when we began, and we're sticking to it. We have intentionally created a friendly environment where personal efforts are recognized, and we are keeping that way, despite our rapid growth.

Linda Catenacci would like to hear from you at Amdahl Corporation, 680 Fifth Ave., New York 10019. We are, of course, an equal opportunity employer.

MARKETING OPPORTUNITY AT AMDAHL

PROFESSIONAL LARGE-SCALE COMPUTER SYSTEMS SALES

You are the right candidate for this opportunity if you do not *have* to make a move; if you are currently leading your peers in competence, enthusiasm and performance, and if you have a need to be on a winning team selling the better product. You will have a thorough knowledge of the large-scale computer marketplace, and a five-year performance record. You will enjoy the personal and professional satisfaction of selling the proven price-performance leader, and enthusiastically relating the Amdahl success story to a wide audience that is anxious to hear the details. In addition, you will enjoy an extremely attractive income, incentive and benefits package. Immediate openings exist in our Eastern Division, headquartered in New York City.

amdahl

SYSTEMS ANALYST/ PROGRAMMER

Salary area $15,000

This is your opportunity to move into the growing mini computer field with one of our high technology client companies. A minimum of one year programming experience in any hardware requested. COBOL programming experience desired.

ANALYST/PROGRAMMER

Salary area $18,000

If you have an analytical mind and can work closely with EDP users, this position with a diversified $100 million company offers good equipment and truly promotable future. One plus years programming/analysis experience in business applications required.

For further details, contact Tom Fischer or Tom Lilliker at (713) 658-9898.

ALL FEES ASSUMED BY CLIENT COMPANIES

M. David Lowe
Personnel Services Inc.
420 Houston Natural Gas Bldg.
Houston, Texas 77002

SYSTEMS ANALYSTS APPLICATION PROGRAMMERS SYSTEMS (SOFTWARE) PROGRAMMERS

All levels of experience, including Project Managers. Starting salaries $13,500 to $26,000.

Companies pay all fees & expenses.

Resumes published under code numbers — no names. Our client firms are located nationwide and are engaged in every type business.

FREE — EDP OPPORTUNITIES BULLETIN, a representative list of our DP career opportunities, mailed free of charge upon request (HOME ADDRESS ONLY).

For further information on these and other positions, send your resume in strict confidence to:

Mark Futler
Cadillac Associates, Inc.
32 W. Randolph St.
Chicago, IL 60601
(312) 346-8400

Computer Systems Gurus

Your job title may be Systems Engineer. Or Systems Analyst. Or R&D Programmer. Or you-name-it.

What you are, for sure, is a computer expert. A systems guru, with the ability to communicate effectively with customers.

If you are — and if you're the best — we have jobs waiting that will stretch your professional and personal abilities to their limits.

In just over 8 years we've grown to more than $160 million in annual sales. We did it by redefining and extending the market for small computers. And by developing NOVA®, ECLIPSE® and microNOVA computer systems to meet the new market.

We have immediate openings in Manhattan, Boston, the San Francisco Bay area, Falls Church, VA, Chicago and Wayne, NJ as well as in other major cities in the United States and Canada.

So if you have two or more years' systems engineering experience in pre-sales and post-sales situations, stop meditating and call Jim Masciarelli collect at (617) 481-5160.

If you prefer, you can mail your resume to Jim Masciarelli's attention at Data General Corp., Route 9, Southboro, MA 01772. An equal opportunity employer.

Data General

EDP AUDITOR

Assisting the Internal Audit Staff, you will be responsible for assuring the reliability of computerized information systems operating with a variety of hardware and software. Physical and data security are major concerns.

Specific Duties:

- Plan, direct, organize and control EDP audit and security systems.
- Coordinate program schedules and activities with systems staff and functional users.

Business degree plus 3-5 years EDP experience required.

Working knowledge of COBOL and RPG II plus systems development experience in manufacturing as well as administrative areas.

35%-40% travel required. Salary commansurate with experiance.

Send confidential resume including salary history to:

AMF Incorporated
Mr. Michael M. Graham
Mgr./Corporate Recruiting
777 Westchester Avenue
White Plains, N.Y. 10604

An Equal Opportunity Employer, M/F, HDCPD

COMMUNICATIONS SOFTWARE DEVELOPMENT

1. This position entails the systems design and development of software for large communications networks. Experience at all levels in PDP/11 Assembly language and telecommunications. Other mini-computer experience will be considered. Some travel required. Salary to mid $20K.
2. This position requires a minimum of 2 years experience in DEC PDP/11 Assembly language. Must have experience with on-line teleprocessing applications with CRT and teleprinting. Salary up to $17K.

Please send resume to:

AW CONSULTANTS, INC.
818 Chestnut Street
Philadelphia, Pa. 19107

PLASMA PHYSICS LABORATORY

A directed research arm of Princeton University, funded by the United States Energy Research and Development Administration, is engaged in a long-range program involving Controlled Fusion Energy. Our continuous growth has created the following opportunity . . .

SENIOR SYSTEMS PROGRAMMER

Our real-time computers, including a PDP 10 and PDP 11's, perform data acquisition, analysis and display for large fusion research experiments. We are currently involved in designing an expansion of this system. We are seeking an experienced Senior level Systems Software Designer to join our growing software effort. You must have knowledge of real-time operating systems, networking, and a feel for reliability. We prefer experience with software design in a multi-person effort.

Benefits include 1 month vacation, group life and major medical insurance, tax deferred fully vested retirement plan, etc. For prompt consideration, please send detailed resume and salary requirements in confidence to Personnel Director; Project 1-23. Please refer to Project Number.

Plasma Physics Laboratory

Princeton University

POST OFFICE BOX 451
PRINCETON, NEW JERSEY 08540

An Equal Opportunity / Affirmative Action Employer M/F

MINI COMPUTER MAINTENANCE SPECIALIST

University Computing Services at the State University of New York at Buffalo has a vacancy for a Mini Computer Maintenance Specialist to maintain mini's and associated peripherals on the SUNY/AB Campus. Candidates should have a minimum of five years experience in the maintenance of mini computers, peripheals, and digital interface circuits with at least two years troubleshooting experience at the component level. Primary experience with Data General, DEC or Varian preferable. Opportunity to manage an expanding maintenance group. Competitive salary. Excellent fringe benefits. Eligibility for future permanent appointment. Write or call in confidence:

James Whitlock
University Computing Services
4250 Ridge Lea Road
Buffalo, N.Y. 14226
(716) 831-1781

Deadline for Applications: Dec. 13. Affirmative Action/Equal Opportunity Employer.

SYSTEMS ANALYST SCIENTIFIC PROGRAMMERS

Interactive

Growing company has excellent opportunities for individuals with degree in engineering, mathematics or equivalent experience to work on state of the art interactive design drafting system.

Successful candidates must have experience in machine language and higher level language on digital scientific computers. Background in data base design, computer graphics or time shared operating systems an asset.

Excellent starting salary, ideal professional environment and full fringe benefit program. Relocation expenses paid to this ideal area for living and working.

To arrange confidential interview send resume to Watson Peterson, Jr., Director of Personnel

Gerber Scientific
Instrument Company
83 Geber Road
South Windsor, Conn. 06074
equal opportunity employer m/f

Senior Software Design Engineer

We are looking for a challenge-seeking individual who will guide the formation of a language development group. We seek innovative approaches to programming terminals and developing software.

This challenging position requires previous experience in the successful design and implementation of a high level language compiler or interpreter. Planning, communicating and leading skills are also necessary.

Tektronix, Inc., develops, manufactures and markets internationally recognized computer peripherals, precision electronic measurement instruments, and related electronic instrumentation. Located near Portland, Oregon, we are within a two hour drive of the Cascade Mountains or Ocean Beaches. The close-by nature playground and the City of Portland provide a variety of recreational and cultural interests.

Salary is open. Benefits include liberal insurance and retirement programs, educational support and profit sharing.

Please send resumes to: Mary A. Walhood, TEKTRONIX, INC., P.O. Box 500, C6, Beaverton, OR 97077.

An Equal Opportunity Employer M/F.

TEKTRONIX®
committed to technical excellence

SYSTEMS ANALYSTS

TO $21,000

Major national co seeks 5 analysts with strengths in manufacturing applications. Requires degree and 3+ years manufacturing experinece in IBM, OS/DOS environment and cobol. Exception opportunity and benefits. Choice of locations: NY, PA, MD, VA, TN. Contact George Nugent. All fees paid.

FOX-MORRIS
Personnel Consultants
409 Washington Avenue
Towson, MD 21204

FLORIDA

S/370 IMS, BAL
BANKING
$23,000

Fee paid — send resume to:

Engineering / EDP Search, Inc.
personnel consultants
84 NE Loop 410, Suite 124E, San Antonio, Texas 78216

ANALYST/PROGRAMMERS SYSTEMS ANALYST

We are seeking degreed inviduals with several years experience in COBOL programming and systems analysis. Sound knowledge of manufacturing business systems helpful. Previous experience with DOS and DBOMP or OS and IMS preferred.

Fisher Controls offers excellent benefits, working conditions and professional growth within a progressive community of 28,000.

Send resume to Bob Lahr, or call (515) 754-3626.

FISHER Controls

FISHER CONTROLS CO.
205 S. Center St.
Marshalltown, Iowa 50158

An Equal Opportunity Employer, M/F

EDP SALES/MARKETING

C.J. Vincent Associates, Inc., was founded to provide professional recruitment and placement services strictly to the field of TECHNICAL SALES/MARKETING. This is based upon our own personal in-depth experience in sales management of high technology and EDP systems. We have been retained to fill positions ranging from Sales Trainees to Sale/Marketing Managers with income potential from $14K to $35K and above. These include a variety of product disciplines with specific present emphasis in the field of digital process control, analytical and medical systems, and EDP systems/services/software.

If your experience and education are compatible with our specialization, we can offer discreet and professional assistance to your career planning. Naturally our fee is fully paid by client companies. Please call or send resume in full confidence to:

C.J. VINCENT ASSOCIATES, INC.
2000 Century Plaza Columbia, Md. 21044
(301) 997-8590
TECHNICAL MARKETING SPECIALIST

PROGRAMMER ANALYST

360/370 OS or VS

We are a leader in providing complex, state-of-the-art text processing systems for state governments, industrial clients, and federal agencies. We have an immediate opening for a programmer/analyst to maintain and support implementation of enhancements to our on-line text editing system programs. Two years IBM 360/370 Assembly Language programming experience is required. This position involves occasional travel.

We offer challenge and opportunity for growth as well as an attractive salary and benefits. Send resume to J.F. Petersen, or call collect Diane Van Tine, (301) 428-0700 to arrange an interview.

ASPEN SYSTEMS CORPORATION
20010 Century Blvd.
Germantown, MD 20767
An Equal Opportunity Employer

360/370 Lessors!

Is your market share in Europe as good as in the US?

If not I am your man: Frenchman, 35 yrs, 10 years selling 360's/370's. Familier with the second hand market and Finance problems. I wish to become your

Manager for France

(or larger area)

Available immediately. Joint venture may be considered. Ready to meet you in the USA. Please write to Computerworld

CW Box 4028
797 Washington St.
Newton, Mass. 02160

SYSTEMS ANALYST

Expanding retailer in Md. has opportunity for analyst with retail background. Experience with ready-to-wear and basic merchandise systems a must. Knowledge of IBM 370 DOS/US helpful. Liberal employee benefits. Send resume and salary required to

CW Box 4830
797 Washington St.
Newton, Mass. 02160

At Robert Half we're as selective in our referrals as you are in your hiring.

After all, both our reputations depend on it.

Because our counselors have accounting, banking and data processing credentials, we're better at evaluating your job requirements as well as a candidate's qualifications. Results? You see only the people who are best for you.

R-H ROBERT HALF PERSONNEL AGENCIES

World's Largest Finance and EDP Personnel Specialist.

Offices in the United States, Canada and Great Britain.

SENIOR SYSTEMS ANALYST

SENIOR PROGRAMMER/ANALYST

Long range planning has created an immediate need for additional personnel.

Fleetguard, one of the Nation's fastest growing manufacturers of diesel and automotive oil, air, water, fuel, and hydraulic filter systems, is seeking to fill the following positions:

Systems Analyst position requires a college degree and a minimum of 7 years experience which must include on-line order entry and manufacturing.

Programmer/Analyst position requires 5 years of systems and COBOL programming experience. A college degree is desirable.

These positions offer good opportunity and high visibility to self motivated individuals with inquisitive natures. Operation is a growing 370/125 DOS/VS installation. Salary commensurate with experience.

Reply in confidence with a resume giving salary history to:

Morris Irby, Jr.
FLEETGUARD, INC.,
A Cummins Company
Route 8 Box 39, Cookeville, TN 38501
An Equal Opportunity Employer

1976 Computer Salary Survey.

Send for your free copy today!

"The Next Step", Source Edp's tenth annual salary survey and career planning guide, is now available. You'll also receive without charge our latest "Digest of Computer Opportunities" describing specific career openings currently available within our client organizations nationwide.

For your free copies of our publications "The Next Step" and "Digest of Computer Opportunities" write:
Source Edp Corporate Headquarters
100 South Wacker Drive
Chicago, Illinois 60606
(P.S. Be sure to use home address and indicate position title.)
Or call your nearest Source Edp Office:

source edp

East: Boston (617/237-3120), New York-New Jersey (201/687-8700), Philadelphia (215/665-1717), Washington, D.C. (703/790-5610).

Midwest: Chicago (312) 782-0857), Cleveland (216/771-2070), Detroit (313/352-6520), Kansas City (816/474-3393), Minneapolis (612/544-3600), St. Louis (314/862-3800).

South & Southwest: Atlanta (404/325-8370), Dallas (214/638-4080), Fort Worth (817/338-9300), Houston (713/626-8705), New Orleans (504/561-6000).

West Coast: Los Angeles (213/386-5500), Irvine, CA. (714/833-1730), Palo Alto (415/328-7155), San Francisco (415/434-2410).

SENIOR ON-LINE PROGRAMMER

The Chicago Board Options Exchange, the nation's central marketplace for trading stock options, is seeking a Senior On-Line Programmer to design and implement applications. System will be run on IBM 370/158 MP configuration interfacing with a real time system utilizing 25 mini-computers controlling over 300 CRT's.

Direct experience with CICS/VS transaction and data base recovery desirable as well as exposure to OS/VSI, MVS, VTAM, NCP and VSAM. Requires 2 years recent assembler language coding experience.

Our compensation package includes highly competitive salary, tuition reimbursement and company paid medical, dental and life insurance. Please send letter, resume or call (312) 431-6931.

Personnel Department
The Chicago Board Options Exchange
141 W. Jackson
Chicago, Illinois 60604
An Equal Opportunity Employer

BUY SELL SWAP

WANTED

BURROUGHS

"L" Series
TC700, TC 3500
F5000
10-10-361; 381 Tellers

NCR

31-32-41-42-43-152

IBM

360, 370 System 3 &32
All others

IOA

I.O.A. Data Corp.
383 Lafayette St., N.Y. 10003
(212) 673-9300
Member Computer Dealers Assoc

1130
1401
Systems & Components

BUY-SELL-LEASE-TRADE

CMI Corporation
23000 Mack Avenue
St. Clair Shores, Mich. 48080
(313) 774-9500
TWX 810-226-9709

Member Computer Dealers Association

MAGNETIC TAPE
FOR SALE!

PMI

WHAT'S THE BEST VALUE?
148 or 155 II or 158
COMPARE

	148	155 II	158 Used	158 New
Delivery	?/77	Dec 78	Scarce	Immed
Performance	.3	.9	1.0	1.0
Price (approx)	35%	45%	85%	100%

Let's talk price/performance

John Delaney
Fred Cholette
Jim Hanly

CIS

CIS Corp.
600 Mony Plaza
Syracuse, N.Y. 13202

(315) 425-1900
Telex: 93-7435

For Sale New Nova 3
For Immediate delivery (10% investment tax credit available)

9495	Nova 3/12 32KW w/Parity
9532	Battery Backup
8531	Power Monitor
8530	Automatic Program Load
4014+ 4074	Bi-Sync Interface
4234	10 Meg Byte Disc
4034	Line Printer Controller Centronics 132 POS 165CPS Printer
4075+ 4077+ 4078	EIA CRT Controller
4079	Real Time Clock
4251	4 Slot Communication Chassis
4255	8 Line Multiplexor
6012	CRT
1012P	Rack Single Cassette & Controller

All DGC Equip. Incl. RDOS Rev. 5

Call Lance Perker, The Computer Company, Richmond, Virginia 23230, (804) 358-2171.

FOR SALE
Burroughs B300
CPU 9.6K Memory
Tape Drives (3) B-422
Printer
Reader
Punch
MICR Reader/Sorter
Asking $20,000
Contact: Jimmy V. Dunn
(615) 546-2937

COMPUTER TAPE WANTED
2400'-1200'-600'-1600 bpi
Any Quantity - Good Quality
Use or New
Top $ Paid
Call Collect
(609) 662-4671

BUY
SELL
LEASE
Peripherals & I/O

3330's	3410's	3211's
3340's	3420's	3505's
3350's	2401's	1403's
2314's		2501's

Gene Chappell

CIS

CIS Corp.
600 Mony Plaza
Syracuse NY 13202
(315) 425-1900
Telex: 93-7435

029 059 026
ALL IBM MANUFACTURED
Eligible For IBM
Maintenance Agreement
SPECIAL SAVINGS SALE
Call For Firm Quote
ALSO
082 083 514
Jim Carleton
CMI CORPORATION
23000 Mack Avenue
St. Clair Shores, MI 48080
(313) 774-9500

3138-I -FEB'77
3148-K -FEB'77
3148-J or K -APR'77
FOR SALE OR LEASE

Northwest Computer Brokers
NCB
1821 114th SE #215
Bellevue, WA 98004
(206) 455-1419

Available Immediately
IBM
Unit Record
Equipment
Including 024, 026, 056, 083, 085, 407, 519, 548, 604

Contact Frank Raymond

Jacob Finkelstein & Sons Inc.
Woonsocket, R.I.
(401) 768-7000

FOR SALE
REPOSSESSED MINI COMPUTER EQUIPMENT

Complete 8202 Nova 900 CPU w/16 Bit Core-Memory, Interface Sub Assembly, Teletype Interface, Power Monitor & Auto Restart. Automatic Program Load w/4011 Paper Tape Reader Control. complete Magnetic Tape Transport, Bucode 100 IPS with 9 Track Read-Write Head. For Information Contact:

DALEY HODKIN CORP.
150 Broad Hollow Rd.
Melville, N.Y.
516/421-1414 212/895-2049

FOR SALE OR LEASE

NEW-ITC QUALIFYING

370/158-3	Available 11/26/76
370/158-1	Available 12/17/76
370/158-3	Available 1/21/77
370/168-3	Available 1/21/77
370/168-3	Available 4/22/77
370/168-3	Available 5/4/77

USED

370/158-3	Available 12/10/76
370/158-1	Available 12/15/76
370/165-K	Available 4/1/77
370/145-IH2	Available 2/1/77

LEASE ONLY

370/155-J
4 Channels, 3950, 7855 & 3215
Available Immediately Any Term

MEMORY

IBM 145 256K I2-IH2
Intel 158 Any Increment
Intel 145 I2-J2

PERIPHERALS (2) IBM 3340-B2

FEATURES 4660 for 370/145

OPM LEASING SERVICES, INC.

99 Wall Street
New York, N.Y. 10005
(212) 747-0220 (800) 221-2674

Member Computer Lessors Association

COMDISCO COMDISCO

The World's Largest IBM Computer Dealer

SELLING 3158K 3168KJ 3165 KJ

LEASING 3165-2 DAT - 60 month lease
3155-2 DAT - 48 month lease

BUYING 3145 3155 3158

WRITE:
Comdisco, Inc.
9701 W. Higgins Rd.
Rosemont, IL 60018

CALL:
(312) 698-3000
East: (201) 568-9666
West: (415) 944-1111

TWX 910-253-1233
Member Computer Dealers Association

COMDISCO COMDISCO COMDISCO COMDISCO

The City of Seattle intends to solicit bids on approximately November 19, 1976 to lease for a three-year term a Large-Scale Virtual Memory Computer to replace existing resources which are no longer adequate.

The computer resources currently utilized by the City consists of the following:

1. NCR 251 Computer: in-house; 192K core; 400 MB disk; 8 tape drives.
2. IBM 155 Computer: OS/MVT Operating system; service-bureau; 26 CPU-hours per week, 700 KB user core partition size, 600 MB disk, 8 tape drives.
3. Other service bureaus using IBM computers of the 158 and 168 scale for a total of about an additional 10 CPU hours per week.

Interested parties should contact the City Purchasing Agent at the address shown below to receive copies of the bid specification.

City of Seattle, Purchasing Agent
Attention: Tom Stromberg
600 Fourth Ave., Room 301 Seattle, Washington 98104
(206) 625-2252

AMERICAN USED COMPUTER
CORPORATION

★ **360/50I** ★
Immediate Delivery

2314 1×9
Our lowest Price!

CALCOMP 1×4
3420-5 TYPE

- ■ 2401-4,-6
- ■ 2540-1
- ■ 2415-1
- ■ 1403-N1
- ■ 1443-N1
- ■ 2365-2

IN STOCK NOW

370/158
If you have P.O. Credits on your rented 158 we will
BUY IT TODAY
and - **PAY YOU**
A BIG $$ BONUS
CALL TODAY!

617-261-1100

[illegible]

FOR SALE
Communication Terminals

- Teletypes - 28 32 33 35
- TWX - TELEX
- DECwriters LA36
- Acoustic Couplers & Hardwire Modems

DATA COMMUNICATION
EQUIPMENT BROKERS, INC.
1878 Thunderbird Street
Troy, Michigan 48084
(313) 362-0470

MINI COMPUTERS

Buying, Selling? Let us do the work for you and save you time and money!

AVAILABLE NOW:
Novas — most models — new & used; DEC 11s & 8s; Printers, disc drives; CRTs, etc.

WANTED
DEC & DGC Systems, CPUs & peripherals.
Buyers waiting for 8Es & 8Ms.

MINI COMPUTER EXCHANGE

(408) 733-4400
TWX 910-339-9272

COMPUTER MEMORIES

370/155 - To 4MB's
360 - 65, 50, 40 & 30
UNIVAC 494, 1106, 1108

All memory sizes
All new
Best prices anywhere

Minneapolis (612) 935-8811
Bob Miller
Dave Hoolahan
Don Moran
Los Angeles (213) 973-0484
Dennis King

FABRI-TEK INC.
COMPUTER SYSTEMS
5901 South County Road 18
Minneapolis, MN 55436

IN CANADA

We specialize in
360/20, 360/30 & up
System 3, 370 Series
We buy your excess
IBM Equipment
CMI Company
P.O. Box 893
Windsor, Ontario N9A 6P2
519-258-8910

360/65 WANTED!!

Any configuration
Any delivery
We Will Buy Today

John Humic
Dean McGaan

CIS

CIS Corp.
600 Mony Plaza
Syracuse, N.Y. 13202
(315) 425-1900
Telex: 93-7435

A New Service For The Used Computer Marketplace

COMPUTER EQUIPMENT INFORMATION BUREAU

FOR BUYERS: CEIB is a free, up-to-date source on current used equipment offerings that's as close as your telephone. Our equipment file includes over 5375 current listings from numerous brokers, dealers, and private sellers. Just call (617) 247-2290 to obtain immediate information on any specific systems or items you're interested in — including seller's names, asking prices, and availability dates.

FOR SELLERS: CEIB is an inexpensive, convenient approach to reaching potential buyers. If you haven't already received our brochure and listing forms, please write or call —

CEIB — P.O. Box 163; Boston, MA 02117 — (617) 247-2290
R. Ferrara, President

3420's 3803's
3333's 3830's
3330's

SALE OR LEASE
ALL MODELS
Darryl Hastings
CMI CORPORATION
23000 Mack Avenue
St. Clair Shores, MI 48080
(313) 774-9500
Member CDA

DEC

DH-11-AA 16 channel MUX
for PDP 11
TA-11-AA Dual Decassettes
for PDP 11
Some spares and components

OTHER MANUFACTURERS

Teletypes - KSR33
Techtran 8421 Dual Cassette
(New)
Tridata Model 40 Tape Cartridge
for PDP-8
AMCO equipment racks,
new and used
Call Jerry DeBaun (301) 825-6400

BUY LEASE SELL

370/115 - 370/125

ECONOCOM
ECONOMIC COMPUTER SALES, INC.
P.O. Box 17825/Memphis, Tennessee 38117
(901) 767-9130

Member: Computer Dealers Association

FOR SALE
BURROUGHS B3500
120 KB Core Memory
800 lpm Line Printer
(2) 800 BPI-9-Tr Tapes
800 CPM Card Reader
20M Bytes Disk (20 ms)
Ernie Lucken
Diversified Computer Applications
2525 E. Bayshore Road
Palo Alto, Calif. 94303
(415) 324-2523

TERMINALS
DATA ENTRY EQUIPMENT

KEYPUNCH SALE

026 .... $995.00
D29 .... $1495.00
029 .... $1995.00

DATA RENTALS/SALES INC
2919 S. LaCienega Blvd
Culver City, Calif
(213) 559-3822

BUYING

N.C.R. PHASE-OUT EQUIPMENT-
31, 32 and 441's
41, 42 and 43 BANK MACHINES AS WELL AS 151 and
152 ADDING MACHINES. ALSO 299 and 399 MINICOMPUTERS
BURROUGHS F-5000/6000 SERIES, L SERIES and 10-10-300 & 10-10-360
TELLER MODELS. FRIDEN 5005 COMPUTYPER
Also A Supplier of SELECT-USED Equipment From - BURROUGHS · I.B.M. · PHILIPS

BUYING OR SELLING - CALL US FIRST!

KEY-EXIMPORT CORP.
256 LIVINGSTON ST. (P.O. BOX 129) NORTHVALE, N.J. 07647
TELEX: 135149 CABLE: KEYEXIMP-NORTHVALENJ

TELE. N.J.
(201) 767-3444
N.Y.C. DIRECT LINE
(212) 736-7736

SYSTEMS MARKETING INCORPORATED SMI
[illegible]

Professional computer dealers in the West handling primarily purchase, sale or lease of 370/125, 135, 245, 3330 disks, 3420 tapes, 3277 terminals.
Call us for your hardware needs. You'll appreciate our integrity, experience and financial strength.

Member CDA

148's Available

For Sale or Lease
As soon as February 1977
CALL Bill Graham
(313) 774-9500
CMI CORPORATION
23000 Mack Avenue
St. Calir Shores, MI. 48080

MCC

BUY/SELL/LEASE/TRADE

IBM 360s, 370s, System 3s, all Peripherals
3830s, 3333s, 3330s, 3420s, 3803s
Purchase/Leaseback or Rental Credit
Machines Wanted
All types 1400 Series; 1130s, 1620s
Unit Record Equipment Refurbished — All Models
Disk Packs — recertified, initialized
Call collect today to Don Norris, President
(214) 634-2780
METROPLEX COMPUTER COMPANY, INC.
Suite 1208 Honeywell Bldg. 1111 W. Mockingbird Lane
Dallas, Texas 75247

370/158 ON ORDER?

NOT INSTALLING?

We need new, ITC qualifying 158's. We're ready with a cash offer for your on-order position.

Contact:
Fred Cholette
John Delaney
Jim Hanly

CIS

CIS Corp.
600 Mony Plaza
Syracuse, N.Y. 13202

(315) 425-1900

3277-2 KEYBOARDS FOR SALE

Computer Sales Int'l has several versions of 3277 keyboards to trade for 4631 keyboards

Call: Bill Roselius
Computer Sales Int'l Inc.
901 Office Park Plaza
Oklahoma City, OK 73105
(405) 840-1911

370 115-125

Buy-Sell-Lease-Trade
The IBM Dealer

CMI Corporation
2300 Mack Avenue
St. Clair Shores, MI 48080
(313) 774-9500
Ask for Mike Vargo

PLANNING TO SEND IT BACK?

[illegible]

[illegible] EQUIPMENT SERVICES, INC.
99 Wall St
New York, N.Y. 10005
(212) 747 0670
(800) 221 2674

15 BURROUGHS TC500 COMPUTERS FOR SALE

Contact:
R.L. Floyd
UNION CARBIDE CORP.
Investment Recovery Dept.
P.O. Box 8361
South Charleston, WV 25303
PHONE: (304) 747-5302

FOR SALE

One Calcomp Model 718 flatbed plotter. Includes Calcomp Model 780 control unit. Utilizes 800 BPI tapes. Off line operation. Guaranteed contract maintenance. Numerous applications. Four color pens. Excellent condition. Available immediately. Shipping weight 2100 lbs. Purchased 1971.

Price $20,000
F.O.B. Pittsburgh
Consolidation Coal Co.
(412) 288-8340

370/125's

For Sale Lease Purchase
Purchase Leaseback

Specialists in 125 Systems

CORPORATE COMPUTERS, INC.
(203) 661-1500
115 Mason St., Greenwich, CT 06830

Member CDA

JAMES COMPUTER CO

BUY/SELL/LEASE/TRADE

024	059	088	519
026	077	129	526
029	082	402	548
046	083	403	552
047	084	407	557
056	085	514	602

1401's · 1130's · 360's
Your source for guaranteed equipment
James Computer Co.
4970 Marine Drive / Chicago, Illinois 60640
Natalie Reyes (312) 271-3311
(312) 728-8871

SALE OR LEASE
IBM UNIT RECORD

024-$250
026-$800
029-$1800
046-$1200
047-$1500
056-$175
059-$1500
077-$350
082-$850
083-$1850
084-$2300
085-$1100
088-$2500

089-$1300
402-$500
403-$900
407-$1200
514-$800
519-$800
526-$1400
548-$1000
552-$1000
557-$3000
602-$300
7330-$150
1401 system-$18,500

THOMAS COMPUTER CORP.
Suite 4202A
800 N. McClurg Court
Chicago, IL. 60611
(312) 944-1401

FOR SALE

[illegible]

- 4 Tape Drives
- 2 [illegible] Disk Files
- 10 [illegible] Char. Memorex Disk Drive
- 4 Multiplexers
- 16 Modems
- 16 Ports

TRANSNET CORPORATION
[illegible] Route 22
Union, N.J. 07083
(201) [illegible]

155

Available for sale or lease. January delivery. Up to 2 MB memory. Also IBM, Telex, or Ampex 155 memory available, with or without upgrades. Call Dick Absher.

165

For sale or lease of 3 years or longer. Early 1977 delivery. 168's also available. Call Ted Molinari.

158 WANTED

Wanted for January or earlier delivery, either Mod 1 or 3. 158's wanted for sublease. Call Dave Tait.

145I2

Systems and memory available for sale. January delivery. Memory also available for immediate delivery. Call Rick Thiele.

135H

Available for sale or lease. December delivery. Memory also available. Call Ed Joseph.

135/145/155 MEMORY

All increments available immediately.

158 MEMORY WANTED

Call Dave Tait.

3340/3411 WANTED

333X/3420 Discs, tapes, and controllers bought, sold, and leased. Call Ed Joseph for an immediate quote.

360 CPU & I/O

360/65's, 50's, 40's, 2401, 2540, 2420-5, 1403-N1, 2821-2, 2821-6, 2314's available. Call Ted Molinari (65's) or Jeff Klein.

CANADA

We specialize in buying, selling, and leasing IBM equipment in Canada. Call Ed Champagne. (Nous parlons francais).

IPS

IPS Computer Marketing Corp.
467 Sylvan Ave.
Englewood Cliffs, N.J. 07632
(201) 871-4200
TWX 710-991-9677

PCM

BUYING
SELLING
LEASING

360/40	370/145	370/135
360/50	370/158	370/155
360/65	370/168	370/165

TAPES / DISKS / CORE

Pioneer Computer Marketing
1165 Empire Central Place Dallas, Texas 75247
214/630-6700

WANTED

For our own use within the next four months . . .

360/50 CPU

Prefer 2 sel channels and 128K

Allied Data
P.O. Box 2408
Olympia, WA 98507
Attention: KEN PARSONS
(206) 458-3535

[illegible]

DECEMBER 1976 AVAILABILITY

158 ITC QUALIFIED

IBM 370/158 DELIVERED TO YOUR EXACT SPECIFICATIONS

Sale or lease terms

John Delaney
Fred Cholette
Jim Hanly

CIS

(315) 425-1900

CIS Corp.
600 Mony Plaza
Syracuse, N.Y. 13202

FORSYTHE McARTHUR

IBM Computer Dealer & Lessor

[illegible]

SYSTEM/3

1130 360/20

BUY • SELL • LEASE

For a prompt, competitive quotation on your IBM needs, call or write today.

"The Small Systems Specialists"

ECONOCOM
ECONOMIC COMPUTER SALES INC
1255 Lynnfield Road
Memphis Tenn 38117
P O Box 17825
(901) 767-9130
TWX 810-591-1205

Member Computer Dealers Association

BEFORE YOU BUY, SELL, OR LEASE, TAKE A 'SECOND' LOOK

NOW

buying: 370/155 370/158
370/165 370/168

selling: 370/135 370/145
370/165 370/135
-145 Memory

leasing: 370/135, 370/155, 370/158

TLW COMPUTER INDUSTRIES INC.

ATLANTA	3570 American Drive, Atlanta, Ga 30341 404-451-1895 TWX 810-757-3654
CHICAGO	312-295-2030
WASHINGTON, D.C.	202-466-2470
LOS ANGELES	213-370-4844

dearborn

dearborn giveth. We have a 2314-A1 available Feb. 1, 1977.
2050HG (2 channel) available January 1, 1977.
2803-1 and three 2401-3 9TR available on Dec. 15, 1976.
Contact Tom Millunchick (312) 671-4410

dearborn taketh away your 370/145, owned or on TLP. Contact Jim Spalding at (312) 671-4410.

dc dearborn computer leasing company
4849 n. scott st., schiller park, IL 60176
chicago (312) 671-4410 • toronto (416) 621-7060 st. louis (314) 727-7277

360/50
360/40
360/30

We specialize
We Buy and Sell Any
360 System or Peripherals
Before you buy or sell get your most competitive offer from CMI.
Bob Van Hellemont
CMI Corporation
23000 Mack Avenue
St. Clair Shores, Mich. 48080
(313) 774-9500
Member Computer Dealers Assoc.

FOR SALE OR LEASE

2 PDP-11/70 Systems
1 PDP-11/40 System

USER SOFTWARE BUSINESS MANAGEMENT SYSTEM

- General Ledger.
- Receivables. Payables.
- Inventory Control.
- On-line Order Entry.
- Bill of Materials.
- Timesharing Users Resource Accounting.

CONTACT: PETER MELVIN

460 Totten Pond Road,
Waltham, MA 02154
INTELLIGENT SYSTEMS
(617) 890-9393

WANTED

3420's 3803's
3333's 3830's
3330's
PCM will purchase your installed disk's or tapes that have maximum rental credits
214/630-6700

PCM
Pioneer Computer Marketing
1165 Empire Central Place
Dallas, Texas 75247

We Need to Purchase Firm Term Leases On Computer Equipment

Write with Details
Attn: Vice President of Finance

CW Box 4808
787 Washington St.
Newton, Mass. 02160

IBM UNIT RECORD EQUIPMENT

024 077 085 402 514 552 026
082 087 403 519 557 029 083
088 407 523 602 056 084 089
406 548 604 029 129

We Buy Sell or Lease
360s 1400s 1440s

IBM COMPUTERS

2040 GF, I/O Set
5 Spindle Calcomp 2314
6-60KB Tape Drives/Sims

ACS
EQUIPMENT CORP

DELIVERABLE IN DECEMBER 1976
155 COMPLETE VIRTUAL SYSTEM
IBM 370/155 I With DAT INSTALLED
ALL IBM MEMORY
Call for sale or lease terms

Contact:
Fred Cholette
John Delaney
Jim Hanly

CIS

CIS Corp.
600 Mony Plaza
Syracuse, N.Y. 13202

(315) 425-1900

TO BUY,
SELL, OR LEASE
CALCOMP DISKS

1030/230 (3330)
1015/215 (2314-D.D.)
CD 14/CD 12 or 22

Write or Call
Gene Wendt

(913) 631-2992
CompuMart, Inc.
6622 Black Swan Dr.
Shawnee Mission, KS 66216

FOR SALE OR LEASE CALCOMP

1015-215 dual-density	1x6 2314 type disks
1030-230	disk storage facility 1x6 3330 type disks
1144-244	disk storage facility 1x6 for UNIVAC 400 and 1100 Series

CALL
Charlie Dieges or Steve Zaleskie
Talcott Computer Leasing, Inc.
1290 Ave. of the Americas
New York, N.Y. 10019
(212) 956-4170 (516) 488-7879
Member: Computer Lessors Assoc.

WANTED TO BUY: 370/158 any model

FOR SALE: 370/155 with DAT

Call Chuck Simonson collect at 203-661-9058
ONE OF THE SEL COMPANIES
SEMAPHORE CORPORATION
666 Steamboat Road, Greenwich, CT 06830

370/125H2

AVAILABLE
FOR SALE
JANUARY 15,
1977
(805) 543-1550 X331

WANTED

Used Model 5500
Delta Terminals

Contact:
D.P. Calvert
(213) 390-8611

CONTACT CSI to BUY SELL LEASE TRADE

Bill Foselius
901 Office Park Plaza
Oklahoma City, Okla 73105
405-840-1911

Al Smith
6111 1960 West
Suite 202
Houston, Texas 77069
713-444-0246

Ken Steinback
11 S. Meramec
Suite 1304
Clayton, Mo 63105
314-727-7010

CSI
COMPUTER SALES INTERNATIONAL, INC.
Member Computer Dealers Association

168-3

NEW, ITC QUALIFIED
December Delivery
4 Meg Memory, Channels: 2860-3,
up to (4) 2880-2's, 2870-1
We will buy or trade other 370 Systems

Charlie Berry
Fred Hughes
Bill Pomeroy

CIS
(315) 425-1900
Telex: 93-7436

CIS Corp.
600 MONY Plaza
Syracuse, N.Y. 13202

---

148 & 138

SYSTEMS AVAILABLE FOR 4 & 5 YEAR OPERATING LEASES

MUST ACQUIRE 370/158

TNCC
THOMAS NATIONWIDE COMPUTER CORPORATION

Brian M. Battle — (312) 944-1401
600 North McClurg Court · Suite 4202A
Chicago, Illinois 60611

Paul Nortman — (516) 752-1000
1 Huntington Quadrangle · Suite 4S13
Huntington Station, New York 11746

FOR SALE OR LEASE
Immediate Availability

360/30 System

64K Model F
with 2540, 1403, 2821, 2311's, 2415-2

1401-12K Tape & Disk System

360/20 Card System

with 1403-2 600 LPM Printer

Peripherals
2804-1 Tape Control 2415-2 4 Tapes & Control
2702-1 Transmission Control (Loaded)
Call Or Write: Roger Foti
(212) 673-9300

I.O.A. DATA CORP.
383 Lafayette St., New York, N.Y. 10003

GO GREYHOUND

WHEN BUYING OR SELLING COMPUTER EQUIPMENT

FOR SALE

Available Now
2-3330-1's
2803-2 & 2420-7's

Available Jan.
370/155J With
AMS Memory & PSU

[redacted]

CMI Slashes Prices to
Beat IBM Price Reductions

360/20

Nation's Leader

S/3

Components & Systems
Sell — Lease — Buy
CMI Corporation
23000 Mack Avenue
St. Clair Shores, Mich. 48080
(313) 774-9500
TWX 810-226-8708

Member CDA

Deal With Confidence
Ask a CMI Customer

---

029 KEY PUNCH

Sale Price
$1995
THOMAS
COMPUTER CORP.
312-944-1401

WANT TO BUY

INCOTERM
VIDIO TERMINALS
MODEL 10/20

CONTACT
William G. Wills
Philadelphia Stock Exchange
(215) 583-4700

370/135
IBM
MEMORY

WANTED

GF-H
Jan/Feb 1977
AVAILABLE
GF-DH

Lou Skavienski Jim Hartnett

CIS

CIS Corp.
600 Mony Plaza
Syracuse, N.Y. 13202
(315) 425-1900
Telex: 93-7435

ITEL WANTS TO

BUY: 370/158

SELL: ½ 360/65 MP
135 IBM Memory
Itel 2314 Dual Density Disk Drives
2841's, 2314's

CONTACT: **Linda Vaughn or Reenie McCarthy**
Itel Computer Products Division
One Embarcadero Center
San Francisco, California 94111
(415) 983-0220, (415) 983-0238

Elspeth Arden
Itel International
London, England
(441) 235-2495

ITEL CORPORATION

FOR SALE OR LEASE

HONEYWELL #1251-4 COMPUTER

81K. CPU w/Console, Interval Timer, Optional Instruction Package, Storage Protect, and Extended Multiprogramming. Three #204B-7 Tape Drives (28.8 KC & 800 bpi) & Control Unit; Two #273 Disk Drives (18.4 MC each) & Control Unit; #277-2 Disk Storage System (128MC); #222-3 Printer (650 LPM) & Print Extension.

Also, Honeywell KEYTAPE #K-716 w/Paper Tape Reader, Left zero (Programmable), Automatic Program Load, 64 character & odd parity, "H" Keyboard Arrangement, Program 2, and Record Counter Incrementing.

All under Honeywell Maintenance, and Available Now, with Demonstrations at any time by appointment.

Formerly used by Apparel Manufacturer and Tape Copy and Printout of all User Programs are available.

Phone (615) 484-6373 or (812) 963-6534 or write P.O. Box 1601, Fairfield Glade, TN, 38555.

Computer System for Sale

DEC PDP-12A

8K Core, ASR 33, T456 dual tape drive, UR12 CRT, A/D converter, relays, sense line input.

Available Immediately
Operated under DEC Maintenance Contract

Call Steve Blain
(603) 868-2844

IBM 129 USERS

CMI will buy the equipment
you are returning to IBM.
CMI will buy & lease back
your equipment at a discount.
We have a plan to suit your needs!

CALL NOW
Jim Carlaton
CMI Corporation
23000 Mack Avenue
St. Clair Shores, MI 48080
(313) 774-8500

FOR SALE OR LEASE

I/O SET
with two 1403N1
printers

Contact: Harry Blair
Computer Installations Corp.
(713) 524-1401

TIME & SERVICES

360/30

64K, 4-2415, 3-2311, 1403, 2540. Reasonable. Available 10 P.M. to 10 A.M. Mon. thru Thurs. Nights and 24 Hours Fri., Sat., & Sun.

• • •

call Jim Haith (212) 246-7130
Albert Merrill School
21 W. 60th St.
New York, N.Y. 10023

Datacenter 370 156

3 meg VS2
Specializing in
Remote Job Entry
and Batch
Excellent Technical Support
Very Attractive Rates
Contact: Stu Kerievsky
(212) 564-3030
Datamor
132 W. 31st St.
New York, N.Y. 10001

Prime Time Available

360/50 - 256K

5/2314 - 4/180KB

Call: (212) 725-5775
Infologic
444 Park Ave. So. (30St)
New York 10016

COMPUTER TIME
AVAILABLE
IBM 360-30
All Shifts
(8) 2314 2540 1403N1
(4) 2401 Dual Density
1400 Compatibility
From $35/Hour
Convenient New Jersey Location
JAYANEL COMPUTER
SERVICES, INC.
Clifton, New Jersey
(201) 472-2545

COMPUTER TIME AVAILABLE

Hardware	Software
370/145	DOS/VS
3330 - Mod II	CICS
800 - 6250 bpi Tapes	ETSS
1403 Printers	RJE

NEWSWEEK, INC.
15-17 Microlab Rd
Livingston, N.J. 07039
Ron Ash (201) 994-3100

I.B.M. 360-40

All Shifts 128K, 4-2401 MOD-2, 9-2314, 1403-N1, 2540, 1401 Compatibility.

From $35/Hour

Restaurant Associates, Inc.
1540 Broadway
New York, N.Y. 10036

Contact:
Al Palmo (212) 974-4966
Charles Leigey (212) 974-4967

IBM 370/115

Up to 12 Hours/Day Available
Long or Short Term Lease
160K, 2-3310, 4-3340,
3203-1200LPM

The Korman Corp.
101 Greenwood Ave.
Jenkintown, PA 19046

Contact:
Paul Wolpert (215) CA4-7300

SOFTWARE FOR SALE

Retrieve
Sales/Use Tax rates
automatically
with

SALESTAX™

Many firms avoid costly tax assessments and save valuable staff time too, with . . .

SALESTAX

the magnetic tape file of all Sales/Use Tax Rates. Updated monthly. For free brochure call or write:

VERTEX SYSTEMS inc.
anMAIcompany
650 Park Avenue
King of Prussia, PA 19406
215-337-0500

Weather the Stormy Seventies with MMS GENERAL LEDGER

- Maximizes Internal Control
- Strengthens Cash Management
- Provides Most Reliable Forecasting

Other Financial Systems:
Accounts Receivable
Accounts Payable
Payroll Personnel

SOFTWARE INTERNATIONAL
Elm Square, Andover, Mass. 01610
(617) 475-5040

Move ^up^ *to*

ACCOUNTING IV.

General Ledger and Financial Reporting

Accounts Payable

Accounts Receivable

Three fully integrated financial application systems, proved during years of successful use. Totally ANS COBOL. Call or write today for details.

Informatics Inc

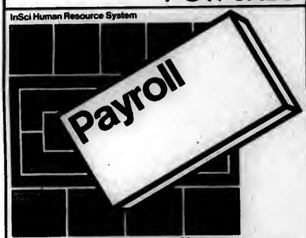
World's Largest in Software Products

65 Route 4, River Edge, NJ 07661

New York: (212) 564-1258
New Jersey: (201) 488-2100
Chicago: (312) 325-5960
Los Angeles: (213) 881-3722
Massachusetts: (617) 481-1180
Philadelphia: (215) 265-7448
Sacramento: (916) 929-1514
Stamford CT: (203) 357-7924

MORE SOFTWARE FOR SALE

InSci Human Resource System



Now for Payroll

A user-controlled system -- up and running fast.

- wide-scope processing
- table-driven
- 999 different earnings, taxes, deductions
- labor distribution module
- powerful retrieval
- comprehensive documentation manuals
- fully supported implementation
- integrated with Human Resource System

Offices in: Montvale, NJ
Oak Brook, IL
San Antonio, TX
Menlo Park, CA
West Palm Beach, FL
Memphis, TN
Raleigh, NC

Please send me information on InSci Payroll!

Frank Cancro, Vice President

InSci
Information Science Incorporated
Dept. CW-S
95 Chestnut Ridge Road
Montvale, New Jersey 07645
201-391-1600

Name:__________
Title:__________
Company:__________
Address:__________
Phone number:__________

Payroll

There's nothing that can ruin employee relations faster than an inaccurate pay check. Except missing a payroll.

The MSA Payroll Accounting System will help you guard against costly manual interventions in your payroll system. • 90 Deductions and Other Earnings • Complete Taxes With "Alltax"® • Flexible Report Writer • Cost/Labor Distribution • Bank Services Including ACH • Over 450 Users • Interfaces With M S A's Full Service Personnel Management & Reporting System Including ERISA, OSHA and EEOC

For further information contact Bill Graves at 404-262-2376 or mail this coupon

MSA
THE FINANCIAL SOFTWARE COMPANY

Management Science America, Inc.
3445 Peachtree Road, N.E.,
Suite 1300, Dept. C-1
Atlanta, Georgia 30328

Chicago, 312-323-5840, Los Angeles, 213-822-8766, New York, 201-871-4700

Name __________
Company __________
Title __________
Address __________
City __________ State __________ Zip __________
Phone __________ Computer Model __________

I am interested in:
☐ Payroll
☐ Personnel Management and Reporting
☐ General Ledger
☐ Fixed Asset Accounting
☐ Accounts Payable
☐ Financial Information and Control
☐ Accounts Receivable
☐ Supplies Inventory Control & Purchasing

---

software for sale | software for sale | software for sale

Executive's Project Control

- Display projects in flowchart format
- Complete control of projects
- Easy to maintain and reproduce charts
- Includes PERT, CPM and Free-form
- Resources Utilization
- Sale or consulting services
- Pronet talks to DP managers in their language and they like it!!!

30 DAYS FREE TRIAL

SYSNET COMPANY
322 W. 52nd St. Suite 311
New York, N.Y. 10019
(212) 868-3330

PAYROLL PERSONNEL
x x x
ACCOUNTS PAYABLE
x x x

Modular, flexible systems with multi-company capabilities. Presently functioning for a variety of users. All programs written in COBOL.

ARGONAUT INFORMATION SYSTEMS, INC.
2140 Shattuck Ave.
#205
Berkeley, CA. 94704
(415) 845-7991

Q-PAC Payroll
Mightiest System of All

- Comprehensive tax module
- Customized personnel processing
- Most flexible report writer
- Powerful general ledger interface

Other financial systems:
General Ledger
Accounts Payable
Accounts Receivable

SOFTWARE INTERNATIONAL
Elm Square, Andover, Mass. 01810
(617) 475-5040

RPG II SYSTEMS

- ACCOUNTS RECEIVABLE
- GENERAL LEDGER
- PAYROLL
- INVENTORY
- CREDIT UNION SHARE/LOAN
- COMPUTER JOB ACCTG.
- MAILING LIST, OTHER

Extensively documented systems at modest prices.

Bancroft Computer Systems
P.O. Box 1533, Dept. C
West Monroe, La. 71291
(318) 388-2236

BURROUGHS
B2700-B4700 USERS

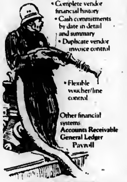
Computer Techniques, Inc. is now making nationally available, its line of Burroughs software support packages and services.

- DBDUMP Pseudo Deck Controller DBDUMP maintains card and control deck images on disk, than accepts an 8 character deck ID which causes the appropriate pseudo file to be generated and executed. Tape numbers of all dumptapes are automatically logged for reference as dumps occur. Load commands can be linked to dumps to force current volume loads unless operator override. Maintains a full run log during processing.
  Purchase $750 Lease $500
- DBTIME Display/Accept Handler At specified times of the day, DBTIME will send a user defined system accept (AX) message to any program in the mix. Optionally displays on SPO. Interfaces directly to DBDUMP to cause dumps, executes, LOGOUT, etc. on an automatic time schedule. Manages 20 or more messages concurrently, each having up to 12 process times per day.
  Purchase $350 Lease $250
- DISKOK-RM Detects NEED-USER-DISK-SEGS messages and responds with automatic OK's to any subsys. Optionally RM's all DUP LIB's.
  Purchase $350 Lease $250
- LOADEU LOADMP Tape Analyzer Analyzes LOADMP tapes and creates a report describing each file. Included are file name, record size, block size, EOF pointer, subsystem and EU location, segments per page.
  Purchase $350 Lease $250
- TDSRJE On-Line Programming and RJE System. Included are: Full set of COBOL source file handling routines and COBOL PBD error scans, Full set of pseudo file creation and execute routines, Generalized edited PBD file scans and changes, Screen to printer, Screen to disk, Formatted and unformatted disk file header display, Alpha and hex disk segment readout (any file) and modify, Make SPO type status requests, Entry of system control messages, Display to SPO or another terminal, and much more.
  Purchase $1850 Lease $1200
- CRTSPO Display any set of user selectable SPO displays on TD8's, such as WY/ OLMTP/ etc. Selectable message frequency.
  Purchase $350 Lease $250
- Custom Build Data-Comm Handlers and Interfaces. We have several off the shelf MCS and handler interfaces fully tested, ready to go.
  FROM $750
- We specialize in total systems development. If you have a Medium System on order or just have heavy application system needs, give us a call. Our experience can save you money.
- Call or write for direct shipment or further info:

COMPUTER TECHNIQUES, INC.,
3131 Fernbrook Lane N.
Minneapolis, MN 55441
(612) 553-1846

MMS
Accounts Payable-II Keeps The Well From Going Dry!

Exclusive features
- Data base design — all COBOL
- Complete vendor financial history
- Cash commitments by date in detail and summary
- Duplicate vendor invoice control



- Flexible voucher/line control

Other financial systems
Accounts Receivable
General Ledger
Payroll

SOFTWARE INTERNATIONAL
Elm Square, Andover, Ma. 01810
(617) 475-5040

MEDICAL BILLING SYSTEM

A COMPLETE MEDICAL BILLING SYSTEM IS AVAILABLE NOW . . .

You can now have the capability of processing doctors, groups, and clinics with this complete system for billing and insurance processing. The system provides:

- Complete Insurance Forms
- Profile, RVS, ICDA Files
- Bal forward, Ledger
- COBOL or RPG II, DOS or OS
- 360/370 or mini-computers

Occidental Computer Systems
10202 Riverside Drive
No. Hollywood, Calif. 91602
(213) 763-5144

BURROUGHS
B-1700 USERS

Operations Support Software

- * RPGMAIN - RPG Source Program Library Maintenance
- * COBMAIN - COBOL Source Program Library Maintenance
- *PROCMAIN - Procedure and Sort Specifications File Maintenance
- * NAMEMAIN - Automatic File Name Changing
- * SCHEDULE - Execution Time Program Scheduler

MARCHBANKS & PARKER, INC.
4538 Centerview Drive
San Antonio, Texas 78228
(512) 736-1909

Whether you're buying, selling, swapping, hiring, or looking, Computerworld Classifieds work.

Issue Dates: *Computerworld* is issued every week dated Monday. We must have your ad in our office no later than the second Friday preceding the issue date. Please be sure to specify the section you want to place your ad in. Sections are: Turnkey Systems, Time and Services, Software for Sale, Position Announcements, and Buy/Sell/Swap.

Copy: If you have an ad agency, have them send us a camera-ready paste-up mechanical or a film negative of your ad. If not, we'll be happy to typeset your ad and prepare it for publication for no extra charge. Please attach CLEAN, typewritten copy with an indication of headlines and subheads, for boldface treatment. We'll set your ad to fit the size you specify, if possible.

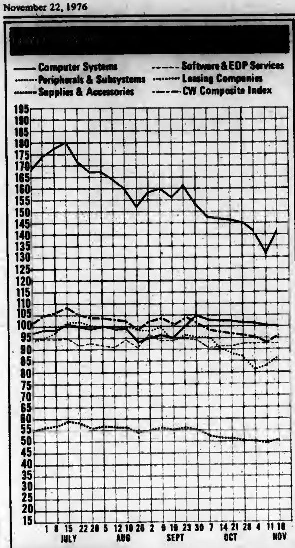
Cost: Our rates are $49.70 per column inch. Minimum size ad is two column inches and costs $99.40 per insertion. Extra space is available in half-inch increments and costs $24.85. Box numbers are $1.00 extra.

Billing: Once your ad is ready, send it to us with the issue date(s) you want and the section you want to be in. If you're a first-time advertiser, we must have your payment in advance.

☐ I have enclosed my check. ☐ I would like to speak with a salesman.
☐ I would like further information, please send me a rate card.

Ad Size:__________ Issue Date(s):__________ Section:__________
Signature __________ Date:__________
Name:__________ Title:__________
Company:__________
Address:__________
__________ Tel:__________

Send this form to: Pam Palmer, Classified Advertising, or Kathy Steinberg, Recruitment Advertising
COMPUTERWORLD, 797 Washington St., Newton, Mass. 02168



Earnings Reports

INCOTERM
Three Months Ended Aug. 25

	1978	1975
Shr Ernd	$.25	$.29
Revenue	5,873,000	7,999,000
Earnings	656,000	585,000
6 Mo Shr	.46	.65
Revenue	17,118,000	16,612,000
Tax Cred	.....	193,000
Earnings	912,000	1,298,000

MEGADATA COMPUTER & COMMUNICATIONS
Three Months Ended July 31

	1978	1975
Shr Ernd	$.09	$.02
Revenue	1,427,000	540,000
Tax Cred	.....	6,890
Earnings	79,425	15,350
9 Mo Shr	.24	.....
Revenue	4,247,000	2,007,000
Tax Cred	.....	29,190
Earnings	194,672	82,754

MOHAWK OATA SCIENCES
Three Months Ended July 31

	1978	1976
Shr Ernd	$.19	$.31
Revenue	38,948,000	41,732,000
Tax Cred	545,000	685,000
Earnings	1,436,000	2,158,000

DATAPRODUCTS
Three Months Ended Sept. 25

	1978	1975
Shr Ernd	$.36	$.21
Revenue	25,181,000	20,209,000
Earnings	2,654,000	1,401,000
6 Mo Shr	.83	.45
Revenue	54,881,000	38,902,000
Earnings	e6,229,000	b3,132,000

e-Includes $1.1 million gain from sale of building. b-Includes $739,000 gain on sale of Data Card Corp. shares.

DECISION DATA COMPUTER
Three Months Ended Aug. 28

	1976	1976
Shr Ernd	$.12	.....
Revenue	8,721,000	$7,579,000
Earnings	440,000	a(663,000)
9 Mo Shr	.....	.....
Revenue	25,542,000	30,426,000
Loss	162,000	d170,000

a-Includes $192,000 from foreign investment write-off.

Computerworld Sales Offices

National Sales Manager
Roy Einreinhofer
Advertising Administrator
Judy Milford
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800
Telex: USA-92-2529

Boston
Robert Ziegel
Northern Regional Manager
Mike Burman
Account Manager
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800

New York
Donald E. Fagan
Eastern Regional Manager
Frank Gallo
Account Manager
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

San Francisco
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Donna Dezelen
Account Coordinator
COMPUTERWORLD
1212 Hearst Bldg.
San Francisco, Calif. 94103
Phone: (415) 495-0990

Los Angeles
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Kathy Klein
Account Coordinator
1434 Westwood Boulevard
Los Angeles, CA 90024
(213) 475-8486

Japan:
Mr. Shigema Takahashi
General Manager
Dempa/Computerworld
1-11-15 Higashi Gotenda
Shinagawa-ku, Tokyo 141
Phone: (03) 445-6101
Telex: Japan-26792

United Kingdom:
Roger R. Frampton
Computerworld Publishing Ltd.
140-146 Camden Street
London NW1 9PF, England
Phone: (01) 485-2248
Telex: UK-26-47-37

West Germany:
Manfred Kufner
Computerworld GmbH
8000 Munich 40
Tristanstrasse 11
West Germany
Phone: (089) 36-40-36
Telex: W.Ger-5-215250-HKFD

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, NOVEMBER 17, 1976

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1976 RANGE (1)	CLOSE NOV 17 1976	WEER NET CHNGE	WEER PCT CHNGE
O	AMOAHL CORP	23- 30	27 7/6	+2 5/8	+9.3
N	BURROUGHS CORP	64-108	69 7/6	+6 3/6	+5.1
O	COMPUTER AUTOMATION	10- 19	14 1/6	- 1/4	-1.7
N	CONTROL DATA CORP	18- 27	22	+ 5/8	+1.7
N	DATA GENERAL CORP	40- 60	45	+1 1/2	+3.4
O	OATAPOINT CORP	24- 46	28 1/4	+4 5/4	+20.2
O	OIGITAL COMP CONTROL	2- 7	5 3/6	- 1/6	-2.2
N	OIGITAL EQUIPMENT	46- 60	52 1/4	+3 1/4	+6.6
N	ELECTRONIC ASSOC.	2- 5	2 1/6	- 1/6	-5.5
A	ELECTRONIC ENGINEER.	7- 16	6	+ 3/6	+4.9
O	FOUR-PHASE SYSTEMS	13- 21	14 3/6	+ 1/4	+1.7
N	FOSBORO	26- 50	44 1/2	+1 1/4	+2.6
O	GENERAL AUTOMATION	4- 11	4 1/4	+ 1/8	+3.0
O	GRI COMPUTER CORP	1- 1	5/8	0	0.0
N	HEWLETT-PACRARO CO	60-117	65 5/6	+1 7/8	+2.5
N	HONEYWELL INC	34- 56	43 1/2	+1 7/6	+4.5
N	IBN	227-288	267 1/2	+0 1/2	+2.4
O	MANAGEMENT ASSIST	1- 6	5 3/4	+ 1/4	+4.5
O	MEMOREX	17- 33	18 1/4	+ 1/8	+0.6
O	MICRODATA CORP	10- 26	14 1/6	- 1/2	-3.4
O	MODULAR COMPUTER SYS	3- 14	5 3/4	+1 1/4	+30.0
N	NCR	24- 37	33 1/4	+ 3/4	+2.5
O	PRIME COMPUTER INC	4- 14	14	+ 3/4	+3.6
N	PERRIN-ELNER	19- 27	19 1/4	- 3/4	-3.7
N	RAYTHEON CO	43- 67	60	+ 7/6	+1.4
N	SPERRY RAND	40- 52	44 5/6	+1 7/6	+4.4
O	SYCOR INC	9- 31	12 1/2	+5 1/2	+38.6
A	SYSTEMS ENG. LABS	5- 10	A 1/6	+1 1/8	+22.5
N	VARIAN ASSOCIATES	12- 17	15 1/4	+ 7/8	+7.0
A	WANG LABS.	11- 20	13 5/8	+ 1/4	+1.8

LEASING COMPANIES

EXCH		1976 RANGE (1)	CLOSE NOV 17 1976	WEER NET CHNGE	WEER PCT CHNGE
O	BOOTHE COMPUTEA CORP	1- 8	8 1/2	+ 5/8	+6.1
O	COMDISCO INC	3- 10	9 1/2	+ 1/2	+3.5
A	COMMERCE GROUP CORP	2- 3	1 5/4	+ 1/8	+7.6
A	COMPUTER INVSTRS GRP	1- 5	1 3/8	0	0.0
N	OATRONIC RENTAL	1- 6	7/8	+ 1/6	+10.6
A	OCL INC	1- 1	5/8	0	0.0
N	OPF INC	3- 8	6 7/8	+ 1/2	+7.8
N	ITEL	6- 15	12 1/2	+ 5/8	+3.2
N	LEASCO CORP	6- 19	18	+ 3/6	+2.1
O	LEASPAC CORP	0- 1	1/6	0	0.0
O	NRG INC	0- 1	1/6	0	0.0
A	PIONEER TEX CORP	6- 9	7 1/4	0	0.0
N	U.S. LEASING	7- 12	8 3/6	+ 1/4	+2.9

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1976 RANGE (1)	CLOSE NOV 17 1976	WEER NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 3	1	- 1/6	-11.1
O	ANACOMP INC	6- 11	6 3/4	- 1/4	-5.5
A	APPLIED OATA RES.	2- 4	3 5/6	- 1/6	-3.3
N	AUTOMATIC OATA PROC	17- 35	27 1/2	+2	+7.6
O	COLEMAN AMERICAN COS	2- 6	2 3/8	- 1/8	-5.0
O	COMPU-SERV NETWORK	3- 10	8	-1 1/4	-13.5
O	COMPUTER OIMENSIONS	3- 7	5 3/4	0	0.0
O	COMP ELECTION SYSTMS	3- 9	3 1/4	+ 1/2	+10.3
O	COMPUTER HORIZONS	1- 2	1 1/2	+ 1/4	+20.0
O	COMPUTER NETWORK	2- 6	5 3/4	+ 3/6	+6.9
N	COMPUTER SCIENCES	4- 6	3 3/8	0	0.0
O	COMPUTER TASK GROUP	1- 2	1 1/4	0	0.0
O	COMPUTER USAGE	3- 8	2 5/4	+ 1/4	+10.0
O	CONSHARE	2- 9	3 1/2	+ 3/4	+13.7
O	OATA OIMENSIONS INC	2- 4	3	- 1/4	-7.6
O	OATATAB	1- 2	1 1/2	0	0.0
N	ELECTRONIC OATA SYS.	12- 16	13 7/8	+ 7/6	+3.6
O	INFONATIONAL INC	1- 1	1/6	0	0.0
O	INSYTE CORP	1- 3	1 1/2	+ 1/8	+9.0
O	IPS COMPUTER MARKET.	1- 2	1 1/6	- 1/4	-16.1
O	KEANE ASSOCIATES	2- 4	2 5/6	- 3/8	-20.6
O	KEYDATA CORP	1- 5	1 1/2	- 1/8	-7.6
O	LOGICON	3- 3	5	+ 1/4	+3.2
A	MANAGEMENT DATA	1- 3	2	0	0.0
A	NATIONAL CSS INC	13- 23	18	+ 1/4	+1.4
O	NATIONAL DATA CORP	4- 7	5	0	0.0
A	ON LINE SYSTEMS INC	17- 22	16 3/8	+1 3/6	+9.3
N	PLANNING RESEARCH	3- 3	5 5/6	+ 1/2	+16.0
O	PROGRAMMING & SYS	1- 1	3/8	0	0.0
O	RAPIDATA INC	2- 3	1 5/6	- 1/4	-13.3
O	REYNOLDS & REYNOLD	13- 21	13 1/4	- 5/4	-4.0
O	SCIENTIFIC COMPUTERS	1- 1	7/6	0	0.0
O	TYMSHARE INC	14- 26	16 1/2	+1 3/4	+11.8
A	URS SYSTEMS	3- 3	3 1/2	- 1/4	-6.0
N	WYLY CORP	1- 7	1 1/4	- 5/6	-25.0

PERIPHERALS & SUBSYSTEMS

EXCH		1976 RANGE (1)	CLOSE NOV 17 1976	WEER NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	8- 15	11	+1	+10.0
O	ADVANCED MEMORY SYS	4- 10	8 1/4	- 1/2	-7.4
N	AMPEX CORP	5- 10	6 1/4	+ 1/6	+2.0
O	ANDERSON JACOBSON	2- 4	3	+ 1/8	+4.3
O	APPLIED OIG DATA SYS	13- 25	10	- 1/2	-5.0
O	BEEMIVE MEDICAL ELEC	3- 9	8 5/6	+ 1/6	+1.5
A	BOLT,BERANEK & NEW	7- 11	7 7/8	+ 1/6	+1.8
N	BUNKER-RAMO	5- 10	7 1/6	+ 3/6	+5.5
A	CALCOMP	4- 7	4 3/4	+ 3/6	+6.5
O	CAMBRIDGE MEMORIES	0- 6	1/2	- 1/8	-20.0
N	CENTRONICS DATA COMP	20- 36	24 7/8	+1 5/6	+6.9
O	CODEX CORP	22- 42	28 1/2	+1 1/2	+3.5
O	COGNITRONICS	1- 1	1/2	0	0.0
O	COMPUTER COMMUN.	1- 6	4 7/8	+ 3/6	+6.3
O	COMPUTEA CONSOLES	4- 7	4 1/4	+ 3/4	+21.4
A	COMPUTER EQUIPMENT	1- 3	1 7/6	+ 1/4	+15.3
O	COMPUTER TRANSCEIVER	1- 3	7/8	+ 1/6	+16.6
O	COMTEN	4- 9	7 1/8	+ 1/6	+1.7
N	CONRAC CORP	20- 25	21 1/2	+ 3/4	+5.0

EXCH		197A RANGE (1)	CLOSE NOV 17 1970	WEER NET CHNGE	WEER PCT CHNGE
O	OATA ACCESS SYSTEMS	1- 3	4 3/4	- 1/4	-3.0
O	DATA 100	6- 13	6 3/6	+ 5/6	+6.0
A	OATA PRODUCTS CORP	3- 13	11	+ 1/2	+4.7
O	OATA TECHNOLOGY	1- 2	1 1/2	+ 1/4	+20.0
O	OATUM INC	1- 2	3/6	- 1/6	-16.6
O	OECISION DATA COMPUT	1- 4	1 1/2	0	0.0
O	DELTA OATA SYSTEMS	1- 1	1/2	- 1/8	-20.0
N	ELECTRONIC M & M	1- 4	2 5/6	0	0.0
O	FABRI-TEK	1- 1	7/6	0	0.0
O	GENERAL COMPUTER SYS	0- 2	1/2	+ 1/8	+53.5
N	HAZELTINE CORP	4- 12	6 5/6	+ 3/8	+7.6
N	HARRIS CORP	54- 33	50 3/6	+ 3/8	+0.7
A	INCOTERM CORP	9- 20	11 3/6	+ 7/6	+6.5
O	INFOREX INC	3- 7	3 7/8	0	0.0
O	INFORMATION INTL INC	10- 18	12	+ 1/2	+4.5
O	INTEL CORP	47-109	48 1/2	+1 1/2	+3.1
A	LUNDY ELECTRONICS	3- 7	3 5/6	0	0.0
O	MSI DATA CORP	3- 7	6 1/4	- 1/4	-5.6
A	MILGO ELECTRONICS	15- 22	20 5/6	+ 1/8	+0.6
N	MOHAWK OATA SCI	3- 10	5 1/2	+ 1/6	+2.5
O	PENRIL CORP	1- 3	1 7/8	0	0.0
A	PERTEC CORP	3- 6	5 3/4	- 1/8	-2.1
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	3- 10	2	0	0.0
O	QUANTOR CORP	4- 6	4 3/8	+ 5/8	+13.6
O	RECOGNITION EQUIP	6- 11	8 3/6	+ 5/8	+8.0
N	SANDERS ASSOCIATES	6- 11	6	+ 3/6	+8.4
O	SCAN OATA	1- 4	1 1/4	0	0.0
O	STORAGE TECHNOLOGY	9- 13	10 3/6	+ 3/6	+6.2
O	T BAR INC	3- 10	3 1/2	- 1/6	-2.2
O	TALLY CORP.	4- 6	3 3/6	+1 5/6	+54.5
O	TEC INC	3- 7	6 1/2	0	0.0
N	TEKTRONIX INC	45- 69	60	+1 1/4	+2.1
N	TELEX	2- 3	2 1/4	0	0.0
O	WANGCO INC	11- 22	21 1/8	0	0.0
O	WILTEK INC	2- 2	1 3/8	0	0.0

SUPPLIES & ACCESSORIES

EXCH		197A RANGE (1)	CLOSE NOV 17 1970	WEER NET CHNGE	WEER PCT CHNGE
O	ADVANCED SYSTEMS INC	1- 4	5 3/6	0	0.0
O	BALTIMORE BUS FORMS	3- 3	5 5/8	+ 1/6	+3.3
A	BARRY WRIGHT	6- 10	6 5/8	+ 3/8	+7.6
O	CYBERMATICS INC	0- 1	5/8	- 1/6	-25.0
A	OATA DOCUMENTS	25- 43	45 1/4	0	0.0
O	OUPLEX PRODUCTS INC	13- 24	12 3/4	0	0.0
N	ENNIS BUS. FORMS	6- 6	3 3/6	- 1/6	-2.1
O	GRAHAM MAGNETICS	8- 13	10 1/4	0	0.0
O	GRAPHIC CONTROLS	13- 19	10 1/4	+ 1/4	+1.5
N	3M COMPANY	33- 66	56 1/2	+1 1/4	+2.2
O	MOORE CORP LTD	32- 31	53 1/4	0	0.0
N	NASHUA CORP	11- 18	13 3/4	+ 1/2	+5.2
O	STANDARD REGISTER	13- 19	17 1/4	0	0.0
O	TAB PRODUCTS CO	5- 11	6 3/4	0	0.0
N	UARCO	19- 25	19 5/6	- 1/4	-1.2
A	WABASH MAGNETICS	4- 9	9 1/4	+ 7/6	+10.4
N	WALLACE BUS FORMS	19- 25	22 1/8	- 5/8	-1.0

Does your IBM host computer do too much telecommunications housekeeping and not enough computing?

Introducing Flexicom's IBM-compatible telecommunications system. With clean, quick, simple host interfacing.

If your company is using a communications network, your host computer's applications growth is limited because of expanding workloads and lack of sufficient support.

The consequences?—Escalating staff and equipment problems. And, of course, the bottom line is increasing costs for your data processing system.

For these reasons, DPF introduces Flexicom.

Consistent Systems Architecture.

Flexicom's software frees your host computer of telecommunications housekeeping by organizing the network and placing tasks where they belong—with Flexicom. That's because it operates as a front-end *or* distributed processor.

And Flexicom serves your operation by acting as a complete telecommunications system. With fast, clean, and uncomplicated host computer interfacing.

IBM hardware. IBM-compatible software.

With Flexicom you don't have to "pioneer." The hardware is a general purpose IBM 360/370 computer sized to your requirements and compatible with your IBM software.

This means only minimal user programming is necessary to integrate Flexicom with your host computer.

A cost-effective, long-term solution.

Flexicom is an inexpensive, long-term solution to data communications problems.

IBM hardware in a telecommunications system that's basically an IBM solution means little training will be required of your staff. Consistent Systems Architecture means future needs will be readily accommodated as they develop. Fewer problems with more efficient equipment means a more productive staff.

And your host computer will be free to do the basic bottom line work.

Additional Flexicom advantages.

- ■ More local processing capabilities than existing competitive systems.
- ■ The network is transparent to the host computer.
- ■ Off-load TP monitoring from the central processing unit.
- ■ Extensive network control statistics.
- ■ Message switching.

We do more than lease IBM computer systems.

DPF is one of the largest 360/370 computer leasing firms in the country. But we do more than lease computers.

With innovative systems like Flexicom, DPF is taking IBM computer systems a step further for our clients.

Let us tell you how Flexicom can help. Call Ed Zukerman collect, at (914) 428-5000.

Or just mail this coupon.

Flexicom

I'm interested in hearing more about DPF and Flexicom.

☐ Please have your representative contact me.

☐ Please send me a brochure and more information.

Name

Title

Phone Number/Ext.

Company

Address State/Zip

Send to: Flexicom
DPF Incorporated
141 Central Park Ave. S.
Hartsdale, N.Y. 10530

dpf
INCORPORATED